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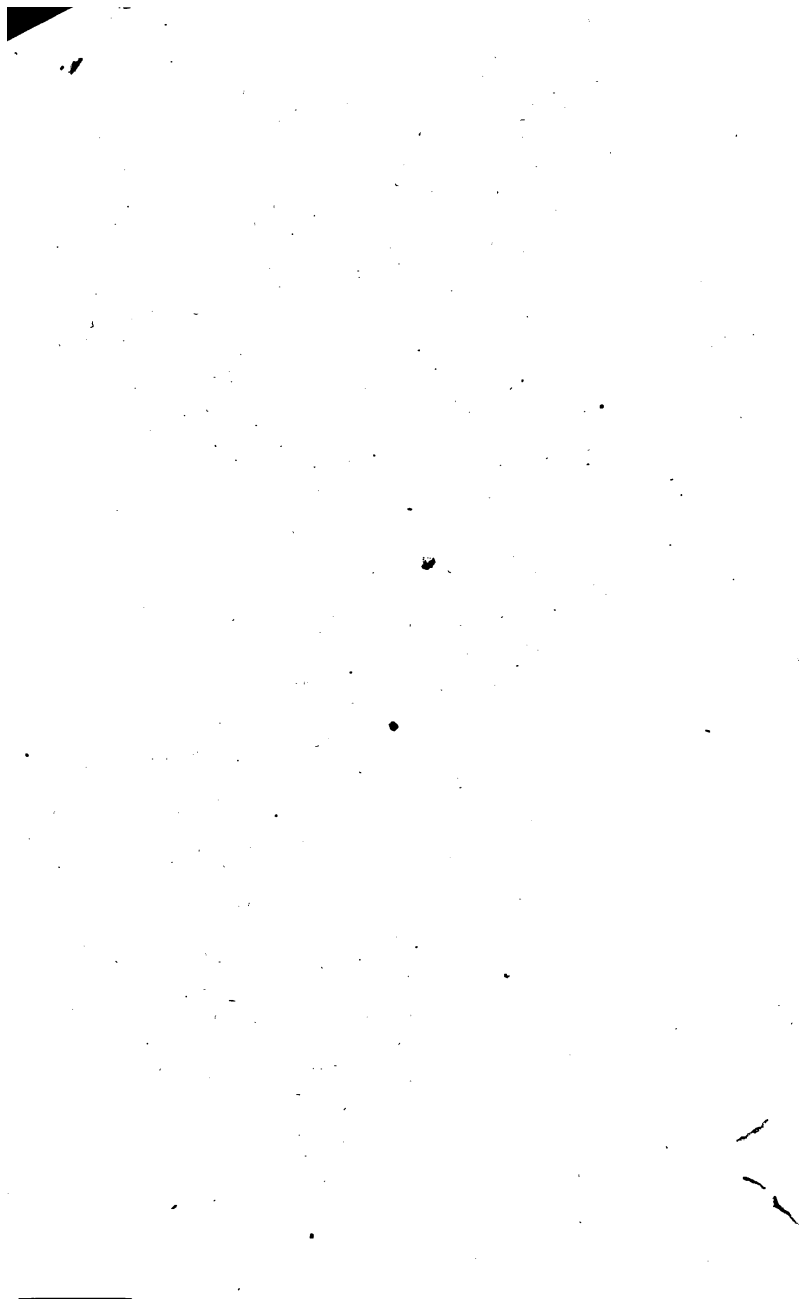
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A. Hume







THE NORTH AMERICAN ARITHMETIC.

THE above is the common title of three books, by Frederick Emerson, late Principal in the Department of Arithmetic, Boylston School, Boston. These books are severally denominated

EMERSON'S FIRST PART, EMERSON'S SECOND PART, EMERSON'S THIRD PART.

PART FIRST is a small book, designed for children from five to eight years of age. The plan of this little book is entirely original, and very peculiar. The lessons are illustrated with cuts and unit marks, and are rendered at once interesting and impressive.

PART SECOND contains within itself, a complete system of Mental and Written Arithmetic, sufficiently extensive for all the common purposes of business, and is designed as a standard book for common schools. This work is so gradual in its progress, that each lesson prepares the learner for that which follows, and comparatively little instruction is required from the teacher.

PART THIRD is designed for advanced scholars. It comprises a synthetic view of the science of numbers, a copious development of the higher operations, and an extensive range of commercial information. Scholars who are to be educated for the business of the counting-room, or for the duties of any public office, as well as those who are to prosecute a full course of mathematical studies, will find this book suited to their purpose.

The Publishers of Emerson's System of Arithmetic invite attention to the following remarks, which are extracted from some of the numerous recommendations of the work.

THE INSTRUCTORS OF THE BOSTON PUBLIC SCHOOLS say—"We have considered it our duty to render ourselves acquainted with the more prominent systems of Arithmetic, published for the use of schools, and to fix on some work which appears to unite the greatest advantages, and report the same to the School Committee of Boston, for adoption in the Public Schools. After the most careful examination, we have, without any hesitancy, come to the conclusion, that Emerson's North American Arithmetic, (First, Second, and Third Parts,) is the work best suited to the wants of all classes of scholars, and most convenient for the purposes of instruction. Accordingly, we have petitioned for the adoption of this work in the Public Schools."

THE BOSTON SCHOOL BOARD, after receiving the petition above alluded to, passed an Order—"That Emerson's North American Arithmetic be substituted for Colburn's First Lessons and Sequel."

THE INSTRUCTORS OF THE NEW YORK CITY SCHOOLS say — "The work is evidently an improvement in the branch of learning which it treats; and we fully concur with the Masters of the Public Schools of Boston in the views which they have expressed respecting its character."

MR. S. W. SETON, Visitor for the Public School Society of New York City, in his remarks upon the First and Second Part, says — "It is as perfect a school book as I have ever examined. None in this branch of instruction has so well and truly illustrated the subject."

PROFESSOR HOPKINS, of Williams College, in a note to the Author of the work, says — "It unites simplicity with fulness, and will thus be sure to interest beginners, whilst it furnishes, at the same time, an ample guide for the more advanced pupil."

PROFESSOR JOSLIN, of Union College, concludes his remarks on the work by saying — "Here the student will acquire not merely rules to guide his hand, but principles to enlighten his understanding. He is not furnished with a mere mill for grinding numbers into a certain result under cover."

PROFESSOR WALL, of Ohio University, among other remarks respecting the work, says — "The method of illustrating the fundamental principles of fractions is clear and forcible, and perfectly happy in its adaptation to the minds of youth."

PROFESSOR HAMILTON, of Nashville University, after examining the First and Second Parts, writes — "I think the work, thus far, better adapted to awaken interest and excite inquiry in the youthful mind, than any elementary treatise which I have seen. The arrangement is natural, and the questions simple and practical, and the rules clearly and fully expressed."

PROFESSOR PEIRCE, of Harvard (Cambridge) University, writes — "I have examined the Third Part of Mr. Emerson's Arithmetic with great pleasure. The perspicuity of its arrangement, and the clearness and brevity of its explanations, combined with its happy adaptation to the purposes of practical business, are its great recommendations. I hope it will be soon introduced into all our schools, and take the place of ill-digested treatises, to which our instructors have hitherto been compelled to resort."

DR. GRISCOM writes — "The North American Arithmetic, by Frederick Emerson, appears to me to exhibit the science of numbers in a manner more clear, simple, and practical, better adapted to the use of schools, and the benefit of teachers, who may not themselves be thoroughly conversant with arithmetic, than any book I have seen."

PROFESSOR M'GOWAN, of St. Louis University, being requested by PRESIDENT VERHAEGEN to examine the work and state his opinion respecting it, writes — "I have carefully examined Mr. Emerson's North American Arithmetic, and consider it the best treatise upon the subject with which I am acquainted."

THE LIVERPOOL (BRITISH) JOURNAL, in a review of Emerson's System of Arithmetic, says — "It is the very best American book which we have seen, on the science of arithmetic and the practice of commercial calculations."

KEY

TO THE

NORTH AMERICAN ARITHMETIC,

PART SECOND

AND

PART THIRD.

FOR THE USE OF TEACHERS

BY **FREDERICK EMERSON,**

AUTHOR OF THE NORTH AMERICAN ARITHMETIC.

PHILADELPHIA:

HOGAN AND THOMPSON.

1848.

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Entered according to Act of Congress, in the year 1838, by FREDERICK EMERSON,
in the Clerk's Office of the District Court of the District of Massachusetts.

PREFACE.

This book contains solutions of some of the questions in the Oral exercises, and answers to *all* the examples in the Written exercises, of the North American Arithmetic, Part Second:— It also contains answers to all the examples, and solutions to the more difficult questions in the exercises of Part Third.

To those who have been accustomed to teaching arithmetic analytically, that portion of the Key which relates to the Oral exercises; will be useless. Nor need it be used by *any* teacher who will *begin* Part Second with a class, and proceed step by step through every section. But it may often happen, that a teacher unacquainted with the method of instructing in mental arithmetic, will be called to the instruction of a school, in which the scholars have already made some progress therein. In such cases, the solutions will be found convenient.

That portion of the Key which relates to the Written Arithmetic, will be found convenient for *all* teachers; as it will save much time in the examination of answers. The advantage of keeping answers to examples out of the text-book is obvious — If the learner have an answer before him, his immediate object will naturally be, to arrive at that answer in his work, with little regard to the reasons why his work leads to it; but, if the answer be unknown, his effort will be, to discover the course, which he shall perceive, *must of necessity* lead to the answer.

F. E.

[F] Soon after the publication of the First Part of the North American Arithmetic, several books appeared, which were evident violations of its copy-right. One of these books has been suppressed; and the others have not been thought worth noticing. Parts Second and Third are now published; and, as their proprietors would avoid litigation, they think proper to give notice, that, if any compiler shall avail himself of the peculiarities of these publications, redress will be sought under the late Act of Congress.

K E Y
TO THE
NORTH AMERICAN ARITHMETIC
PART SECOND.

ORAL SOLUTIONS.

CHAPTER I.

SECTION 1.

Example 6. The figure 1, and one cipher.

7. The figure 1, and two ciphers

SECTION 2.

1. Six tens.
2. Sixty.
7. One-hundred and fifty.
12. One-hundred and seventy-five.

CHAP. II.

SECTION 1.

6. 9 cents and 7 cents are 16 cents.

SECTION 2.

2. 40 oranges and 20 oranges are 60 oranges.
9. 70 books and 50 books are 120 books.

SECTION 3.

2. 30 fishes and 40 fishes are 70 fishes ; 70 fishes and 9 fishes are 79 fishes.

SECTION 5.

2. 7 years and 9 years are 16 years, which will be the son's age. 47 years and 9 years are 56 years, which will be the father's age.

SECTION 6.

1. 29 dollars and 4 dollars are 33; 33 dollars and 5 dollars are 38 dollars.

SECTION 7.

2. 23 cents and 30 cents are 53 cents; 53 cents and 9 cents are 62 cents.

16. 5 and 9 are 14, and 2 are 16, and 8 are 24, and 6 are 30, and 4 are 34.

CHAP. III.

SECTION 1.

3. She must have as many more, as the difference is, between 7 and 12. 7 from 12 leaves 5.

11. He gave the difference between 9 cents and 18 cents. 9 from 18 leaves 9.

SECTION 2.

1. As many of the crew were living, as the difference is, between 30 and 70. 30 from 70 leaves 40.

SECTION 4.

15. 57 and 5 are 62. 5 from 62 leaves 57.

21. 36 and 5 are 41. 5 and 36 are 41. Then 5 from 41 leaves 36. 36 from 41 leaves 5.

SECTION 5.

3. 23 questions and 7 questions are 30 questions. 30 questions and 23 questions are 53 questions.

5. 66 dollars and 30 dollars are 96 dollars. 96 dollars from 100 dollars leaves 4 dollars.

7. 48 dollars and 3 dollars are 51 dollars; 51 dollars and 8 dollars are 59 dollars.

12. Arthur's knife was worth 7 cents more than Walter's; therefore, A. should have *received* 7 cents. But, since A. *paid* 6 cents, he lost 7 cents and 6 cents, which is 13 cents.

22. 8 dollars and 15 dollars are 23 dollars; 23 dollars and 12 dollars are 35 dollars, which is what he paid out. Since he sold the whole for 39 dollars, he gained 4 dollars.

CHAP. IV.

SECTION 1.

2. It will take 5 times as much cloth to make 5 cloaks, as it will to make 1 cloak. 5 times 4 yards are 20 yards.

SECTION 2.

2. 10 and 3. 6 times 10 are 60. 6 times 3 are 18. 60 and 18 are 78. Then 6 times 13 are 78.

SECTION 4

3. In 1 ounce there are 20 penny-weights. In 4 ounces there are 4 times 20 penny-weights, or 80 penny-weights. 80 penny-weights and 13 penny-weights are 93 penny-weights.

CHAP. V.

SECTION 1.

2. I could buy as many pencils, as there are times 4 cents, in 16 cents. 4 in 16, 4 times.

8. As many times as 7 dollars are contained in 14 dollars, so many yards can be purchased. 7 in 14, 2 times.

16. There were as many rows, as there were times 5 trees. 5 in 30, 6 times.

24. 60 limes are worth as many oranges, as 6 is contained times in 60. 6 in 60, 10 times.

SECTION 2.

7. Each boy must pay as many cents, as 3 is contained times in 24. 3 in 24, 8 times.

20. There are as many sheets in each book, as 7 is contained times in 42. 7 in 42, 6 times.

SECTION 3.

2. 8 is contained in 34, 4 times, and there is 2 over; —therefore he can trim 4 vests, and he will have 2 buttons remaining.

13. 4 is contained in 29, 7 times, and there is 1 over. 7 times 4 is 28, and 1 is 29.

25. As many times as 4 is contained in 15, so many

gallon measures can be filled. 4 in 15, 3 times, and 3 over. Therefore, 3 gallon measures can be filled, and there will be 3 quarts over.

29. There are as many hours in 128 minutes, as 60 is contained times in 128. 60 in 128, 2 times and 8 over.
Answer, 2 hours and 8 minutes.

SECTION 4.

9. He spent 9 times 4 dollars, which is 36 dollars.

10. If he had spent just 9 dollars in the journey, this sum would have allowed him 1 dollar a day; therefore, as many times 9 dollars as he spent in the whole journey, so many times 1 dollar did he spend in 1 day. 9 in 36, 4 times:

SECTION 5.

12. 7 times 5 are 35; 8 is contained in 35, 4 times, and there is 3 over.

SECTION 6.

10. He sold the flour for 7 times 6 dollars, or 42 dollars. He lost the difference between 48 dollars and 42 dollars. 48 minus 42 is 6.

12. 9 dollars plus 12 dollars are 21 dollars; 21 dollars plus 7 dollars are 28 dollars, which is what three men put in. The fourth man put in the remainder. 40 dollars minus 28 dollars are 12 dollars.

13. There must have been 8 times 15 dollars, divided. 8 times 15 are 120.

18. 8 cents and 3 cents are 11 cents. 10 times 11 cents are 110 cents, which is what he sold it for.

19. He sold the melons for 4 times 6 cents, which is 24 cents. 25 cents plus 24 cents are 49 cents. 49 cents minus 12 cents are 37 cents.

33. It will take 7 times 1 man, or 7 men.

34. They will perform 9 times 4 days' work or 36 days' work.

35. 36 days' work are required to dig the cellar; and since 4 men will perform 4 days' work in 1 day, it will take them as many days to complete the work, as there are times 4 in 36. 4 in 36, 9 times.

36. 28 men will perform 28 days' work in 1 day; and since 7 men will perform 7 days' work in 1 day, therefore, it will take 7 men as many days to clear the land, as there are times 7 in 28. 7 in 28, 4 times.

40. If he had not found any, he would now have 8 cents. 8 cents and 30 cents are 38 cents, which is what he had at first.

45. The man gathered as many times 7 rows, as the boy gathered times 4 rows. 4 in 32, 8 times; 8 times 7 are 56.

51. The second class gains 9 examples a day; and it will overtake the first, in as many days as 9 is contained times in 81. 9 in 81, 9 times.

59. 8 sheep from 15 sheep leave 7 sheep. 8 times 4 dollars are 32 dollars; 7 times 3 dollars are 21 dollars. 32 dollars plus 21 dollars are 53 dollars; 53 dollars minus 7 dollars are 46 dollars.

CHAP. VI.

SECTION 4.

1. 2 cents, — because, there are 2-halves in a whole sheet, and 2 times 1 cent are 2 cents.

3. 1 is 1-half of 2, — because, there are 2 times 1 in 2.

4. 2-thirds of the loaf is worth 2 times as much as 1-third; and 2 times 1 cent is 2 cents. 3-thirds of the loaf, or the whole loaf is worth 3 times 1 cent, which is 3 cents

6. 1 is 1-third of 3, — because, there are 3 times 1 in 3. 2 is 2-thirds of 3.

7. 1-fourth of a yard will cost 1 cent. 2-fourths will cost 2 cents. 3-fourths will cost 3 cents. A whole yard will cost 4 cents.

9. 1 is 1-fourth of 4. 2 is 2-fourths of 4. 3 is 3-fourths of 4.

SECTION 5.

2. 2 is 1-half of 2 times 2, which is 4.

4. 3 is 1-half of 2 times 3, which is 6. 4 is 1-half of 2 times 4, which is 8. 7 is 1-half of 2 times 7, which is 14.

9. 3 is 1-third of 3 times 3, which is 9. 4 is 1-third of 3 times 4, which is 12. 6 is 1-third of 3 times 6, which is 18.

14. 3 is 1-fourth of 4 times 3, which is 12. 4 is 1-fourth of 4 times 4, which is 16. 10 is 1-fourth of 4 times 10, which is 40.

SECTION 6.

5. 1-third of 6 is as many times 1, as there are times 3 in 6; 3 in 6, 2 times. 1-third of 15 is as many times 1, as there are times 3 in 15; 3 in 15, 5 times. 1-third of 24 is as many times 1, as there are times 3 in 24; 3 in 24, 8 times.

SECTION 8.

7. 1-fifth of 50 is 10. 4-fifths of 50 is 4 times 10, or 40.

17. 1-seventh of 42 is 6, 3-sevenths is 3 times 6, or 18, which is the number of quills that he would give away. 42 minus 18 is 24, which is the number he would have left.

SECTION 9.

3. 5 is 5-sixths of 6. 1-sixth of 42 is 7; 5-sixths is 5 times 7, which is 35.

SECTION 10.

3. If 5 men will cut 20 cords, 1 man will cut 1-fifth of 20 cords, which is 4 cords; 3 men will cut 3 times 4 cords, which is 12 cords.

SECTION 11.

2. Since 10 is 2-thirds of the required number, 1-half of 10 must be 1-third of that number, — 1-half of 10 is 5; since 5 is 1-third of the number, 3 times 5, which is 15, is the number.

21. If 21 workmen can perform 3-fifths of the work, 1-third of 21 workmen can perform 1-fifth of it; 1-third of 21 is 7; if 7 workmen can perform 1-fifth of the work, 5 times 7 workmen, or 35 workmen can perform the whole.

29. 3-ninths plus 4-ninths is 7-ninths; hence the 18 acres must be 2-ninths of the farm. If 18 be 2-ninths, 1-half of 18 acres, which is 9 acres, must be 1-ninth; if 9 acres be 1-ninth, 9 times 9 acres, or 81 acres, must be the whole.

SECTION 13.

1. For 1 dollar you can buy 1-half of a yard, — because 1 dollar is 1-half of 2 dollars. For 3 dollars you can buy

1 yard and 1-half, — because, in 3 dollars, there is 1 time 2 dollars, and 1-half of another 2 dollars.

6. For 1 dollar you can buy 1-third of a gallon. For 4 dollars you can buy 1 gallon and 1-third, — because, in 4 dollars, there is 1 time 3 dollars and 1-third of another 3 dollars.

12. 2 and 1-fourth times, — because, 4 is contained in 9, 2 times, and there is 1 over. 3 and 3-fourths times, — because, 4 is contained in 15, 3 times, and there is 3 over. 8 and 2-fourths times, — because, 4 is contained in 34, 8 times, and there is 2 over.

SECTION 14.

7. As many boys as there are thirds in 3 and 2-thirds. In 1 there are 3-thirds; in 3 there are 3 times 3-thirds, or 9 thirds; 9-thirds plus 2-thirds are 11-thirds.

13. In 1 there are 5-fifths. In 2 there are 2 times 5-fifths, or 10-fifths. In 2 and 3-fifths, there are 2 times 5-fifths plus 3-fifths, or 13-fifths. In 4 and 1-fifth, there are 4 times 5-fifths plus 1-fifth, or 21-fifths.

23. 3 yards and 6-eighths will cost as many dollars, as there are eighths of a yard in 3 yards and 6-eighths. In 1 there are 8-eighths; in 3 there are 3 times 8-eighths, or 24-eighths; 24-eighths plus 6-eighths are 30-eighths.

SECTION 15.

10. 1 and 1-fourth, — because, 4-fourths are contained in 5-fourths, once, and there is 1-fourth over. 3 and 2-fourths, — because, 4-fourths are contained in 14-fourths, 3 times, and there are 2-fourths over. 7 and 3-fourths, — because, 4-fourths are contained in 31-fourths, 7 times, and there are 3-fourths over.

SECTION 16.

5. 31 and 25 are 56. 3-fifths and 4-fifths are 7-fifths, equal to 1 and 2-fifths. 56 plus 1 and 2-fifths is 57 and 2-fifths.

SECTION 17.

3. 7 times 3-fourths are 21-fourths, equal to 5 and 1-fourth

SECTION 18.

3. 4 times 9 is 36; 4 times 2-fifths are 8-fifths, equal to 1 and 3-fifths; 36 plus 1 and 3-fifths is 37 and 3-fifths

SECTION 19.

2. 6 and 7-eighths is 1-fifth of 5 times 6 and 7-eighths. 5 times 6 is 30; 5 times 7-eighths are 35-eighths, equal to 4 and 3-eighths. 30 plus 4 and 3-eighths is 34 and 3-eighths.

3. The whole line is 9 times 5 and 3-fourths yards long. 9 times 5 yards are 45 yards; 9 times 3-fourths are 27-fourths, equal to 6 and 3-fourths. 45 yards plus 6 and 3-fourths yards are 51 and 3-fourths yards.

SECTION 20.

8. 1-fifth of 1 is 1-fifth; 1-fifth of 4 is 4 times 1-fifth of 1, which is 4-fifths of 1.

11. If only 1 barrel were divided, 1 man would receive 1-seventh of a barrel; therefore if 3 barrels were divided, 1 man would receive 3-sevenths of a barrel.

23. 1-fourth of 36 is 36-fourths of 1 — equal to 9 whole ones.

SECTION 21.

6. 1-seventh of 26 is 26-sevenths of 1 — equal to 3 and 5-sevenths. — Or, we may say, — 1-seventh of 26 is 3 and 5-sevenths, — because, in 26 there are 3 times 7 and 5 over, — the 5 over being 5 sevenths of another 7.

7. 1 man will receive 1-fifth of 48 bushels. 1-fifth of 48 bushels is 9 bushels and 3-fifths, — because, in 48, there are 9 times 5 and 3-fifths of another 5.

35. 5 men can clear the land in 1-fifth of 29 days. 1-fifth of 29 days is 5 and 4-fifths days.

38. Since a man can do 8 times as much work in 8 days as he can in 1 day, to hoe the corn in 8 days, it would take 1-eighth of 24 men. 1-eighth of 24 is 3.

SECTION 22.

3. If 22 bushels of wheat will make 4 barrels of flour, 1-fourth of 22 bushels will make 1 barrel; 1-fourth of 22 is 5 and 2-fourths. If 5 and 2-fourths bushels will make 1 barrel, 6 times 5 and 2-fourths bushels will make 6 barrels.

6 times 5 is 30, 6 times 2-fourths are 12 fourths, equal to 3. 30 plus 3 is 33. — Or, we may say, — It will take 6-fourths of 22 bushels to make 6 barrels; 1-fourth of 22 is 5 and 2-fourths, 6-fourths of 22 is 6 times 5 and 2-fourths; 6 times 5 is 30, 6 times 2-fourths are 12-fourths, equal to 3. 30 plus 3 is 33.

SECTION 23.

26. He received 4-fifths of 32 bushels. 1-fifth of 32 is 6 and 2-fifths; 4-fifths of 32 is 4 times 6 and 2-fifths; 4 times 6 is 24, 4 times 2-fifths are 8-fifths, equal to 1 and 3-fifths. 24 plus 1 and 3-fifths is 25 and 3-fifths.

SECTION 24.

6. If 6 be 5-sixths of some number, 1-fifth of 6 is 1-sixth of that number. 1-fifth of 6 is 1 and 1-fifth; then, if 1 and 1-fifth be 1-sixth of the required number, 6 times 1 and 1-fifth is the number. 6 times 1 is 6, 6 times 1-fifth is 6-fifths, equal to 1 and 1-fifth. 6 plus 1 and 1-fifth is 7 and 1-fifth.

15. If he saved 3-sevenths of his wages, the 30 cents which he spent, must have been the other 4-sevenths. If 30 cents be 4-sevenths of his wages, 1-fourth of 30 cents must be 1-seventh of his wages. 1-fourth of 30 is 7 and 2-fourths. If 7 and 2-fourths cents be 1-seventh of his wages, 7 times 7 and 2-fourths cents must be his wages. 7 times 7 is 49, 7 times 2-fourths are 14 fourths, equal to 3 and 2-fourths. 49 cents plus 3 cents and 2-fourths, are 52 cents and 2-fourths.

SECTION 25.

6. $\frac{1}{4}$ is equal to $\frac{1}{4}$ of $\frac{12}{12}$, which is $\frac{6}{12}$. $\frac{1}{2}$ is equal to $\frac{1}{2}$ of $\frac{16}{16}$, which is $\frac{8}{16}$. $\frac{1}{2}$ is equal to $\frac{1}{2}$ of $\frac{20}{20}$, which is $\frac{10}{20}$.

11. $\frac{1}{4}$ is equal to $\frac{1}{4}$ of $\frac{8}{8}$, which is $\frac{2}{8}$. $\frac{1}{4}$ is equal to $\frac{1}{4}$ of $\frac{12}{12}$, which is $\frac{3}{12}$. $\frac{1}{4}$ is equal to $\frac{1}{4}$ of $\frac{16}{16}$, which is $\frac{4}{16}$.

20. $\frac{1}{7}$ is equal to $\frac{2}{14}$, $\frac{4}{7}$ is 4 times $\frac{2}{14}$, or $\frac{8}{14}$. $\frac{8}{14}$ plus $\frac{5}{14}$ is $\frac{13}{14}$.

SECTION 26.

6. 3 in 3, once; 1 is a new numerator: 3 in 6, 2 times; 2 is a new denominator. *Answer*, $\frac{1}{2}$.

B

SECTION 27.

3. $\frac{1}{2}$ of $\frac{1}{3}$ is 6 times less than $\frac{1}{3}$; 6 times 5 is 30, which is the new denominator. *Answer*, $\frac{1}{30}$.

20. In one lot there was $\frac{1}{2}$ of $\frac{2}{3}$ of an acre, and in 3 lots there was $\frac{3}{2}$ of $\frac{2}{3}$ of an acre. $\frac{1}{2}$ of $\frac{2}{3}$ is $\frac{1}{3}$; $\frac{1}{3}$ of $\frac{2}{3}$ is $\frac{2}{9}$; $\frac{2}{9}$ of $\frac{2}{3}$ is 3 times $\frac{2}{9}$, or $\frac{4}{9}$.

SECTION 28.

9. $\frac{1}{2}$ of $\frac{12}{12}$ is $\frac{6}{12}$; $\frac{1}{3}$ of $\frac{12}{12}$ is $\frac{4}{12}$; $\frac{1}{6}$ of $\frac{12}{12}$ is $\frac{2}{12}$.

23. 8 times 7 is 56, which is a common denominator. $\frac{1}{8}$ of $\frac{56}{56}$ is $\frac{7}{56}$, $\frac{3}{8}$ is 3 times $\frac{7}{56}$, or $\frac{21}{56}$. $\frac{1}{7}$ of $\frac{56}{56}$ is $\frac{8}{56}$, $\frac{2}{7}$ is 2 times $\frac{8}{56}$, or $\frac{16}{56}$. $\frac{21}{56}$ plus $\frac{16}{56}$ is $\frac{37}{56}$.

SECTION 29.

2. 5 dollars plus 5 dollars are 10 dollars. The common denominator for *fourths* and *tenths* is 40. $\frac{1}{4}$ of $\frac{40}{40}$ is $\frac{10}{40}$, $\frac{3}{4}$ is $\frac{30}{40}$. $\frac{1}{10}$ of $\frac{40}{40}$ is $\frac{4}{40}$, $\frac{7}{10}$ is $\frac{28}{40}$. $\frac{30}{40}$ plus $\frac{28}{40}$ is $\frac{58}{40}$, equal to $1\frac{18}{40}$, or $1\frac{9}{20}$. Then 10 dollars plus 1 dollar and $\frac{9}{20}$ is 11 dollars and $\frac{9}{20}$.

5. 7 times 4 is 28, a common denominator. $\frac{1}{7}$ of $\frac{28}{28}$ is $\frac{4}{28}$, $\frac{2}{7}$ is $\frac{8}{28}$. $\frac{1}{4}$ of $\frac{28}{28}$ is $\frac{7}{28}$. $\frac{8}{28}$ plus $\frac{7}{28}$ is $\frac{15}{28}$, which is the part of the loaf that the first and second soldiers took. $\frac{28}{28}$ minus $\frac{15}{28}$ is $\frac{13}{28}$, which is the part of the loaf that the third soldier received.

7. $\frac{3}{4}$ is equal to $\frac{9}{12}$, and $\frac{2}{3}$ is equal to $\frac{8}{12}$. $\frac{9}{12}$ plus $\frac{8}{12}$ is $\frac{17}{12}$, or $1\frac{5}{12}$. 2 barrels minus 1 barrel and $\frac{5}{12}$ is $\frac{7}{12}$ of a barrel.

10. 25 plus 2 is 27. $\frac{6}{8}$ is equal to $\frac{60}{80}$, and $\frac{3}{10}$ is equal to $\frac{24}{80}$. $\frac{60}{80}$ plus $\frac{24}{80}$ is $\frac{84}{80}$, or $1\frac{4}{80}$, or $1\frac{1}{20}$. 27 dollars plus $1\frac{1}{20}$ dollars, plus 3 dollars, are $31\frac{1}{20}$ dollars.

SECTION 30.

3. You can buy as many pairs, as $\frac{1}{4}$ of a dollar is contained times in 6 dollars. In 1 there is $\frac{1}{4}$, in 6 there is 6 times $\frac{1}{4}$ or $\frac{6}{4}$; $\frac{3}{4}$ in $\frac{24}{4}$, 8 times. *Answer*, 8 pairs.

7. As many yards can be bought, as there are times $\frac{3}{8}$ of a dollar in 4 dollars. 1 dollar is equal to $\frac{8}{8}$ of a dollar, 4 dollars are equal to $\frac{32}{8}$ of a dollar. $\frac{3}{8}$ in $\frac{32}{8}$, $10\frac{2}{3}$ times. —

Remark. The numerator 3 is contained in the numerator 32, 10 times, and there is a remainder of 2; this 2 is $\frac{2}{3}$ of another time 3

15. He can hoe $\frac{3}{4}$ of the field in as many days, as $\frac{1}{3}$ is contained times in $\frac{3}{4}$. $\frac{1}{3}$ is equal to $\frac{4}{12}$, and $\frac{3}{4}$ is equal to $\frac{9}{12}$. $\frac{4}{12}$ in $\frac{9}{12}$, $2\frac{1}{4}$ times.

SECTION 32.

5. 10 hours a day, for 8 days, would be 80 hours. Then, if he should travel 12 hours a day, he would be as many days in performing the journey, as there are times 12 in 80. 12 in 80, $6\frac{2}{3}$ times, or $6\frac{2}{3}$ times. *Answer*, 6 days and $\frac{2}{3}$.

8. He paid as many times 4 dollars, as there are times 9 dollars in 100 dollars. 9 in 100, $11\frac{1}{3}$ times. 11 times 4 is 44; $\frac{1}{3}$ of a time 4, or $\frac{1}{3}$ of 4, is $\frac{4}{3}$ of 1. *Answer*, 44 dollars and $\frac{4}{3}$.

9. Since $\frac{4}{5}$ of the pole is under the water, the $3\frac{1}{2}$ feet above the water, must be $\frac{1}{5}$ of the length. 5 times 3 is 15; 5 times $\frac{1}{2}$ is $\frac{5}{2}$, or $2\frac{1}{2}$; 15 plus $2\frac{1}{2}$ is $17\frac{1}{2}$.

10. $\frac{3}{4}$ is equal to $\frac{6}{8}$; $\frac{6}{8}$ plus $\frac{1}{8}$ is $\frac{7}{8}$. Then $2\frac{1}{2}$ feet must be $\frac{1}{8}$ of the length of the pole. 8 times 2 is 16; 8 times $\frac{1}{2}$ is 4, or 4; 16 plus 4 is 20.

11. At 9 shillings a bushel, 8 bushels would be worth 72 shillings. A. must return as many bushels as 7 is contained times in 72. 7 in 72, $10\frac{2}{7}$ times.

15. He gets $\frac{1}{16}$ of 1 bushel for grinding $\frac{1}{16}$ of 1 bushel. Therefore, he will get $\frac{1}{16}$ of 16 bushels, for grinding $\frac{1}{16}$ of 16 bushels. $\frac{1}{16}$ of 16 bushels is equal to 1 bushel.

17. As many times as there are 5 sheep in 35 sheep, so many dollars you must pay for pasturing 35 sheep, 1 month; 5 in 35, 7 times. For pasturing 7 months, you must pay 7 times 7 dollars, or 49 dollars.

18. If 3 horses eat 1 ton in 1 month, 1 horse will eat $\frac{1}{3}$ of 1 ton in 1 month; and 4 horses will eat $\frac{4}{3}$ of 1 ton in 1 month. 5 tons will last 4 horses as many months, as there are times $\frac{4}{3}$ in 5. 5 is equal to $1\frac{1}{3}$. $\frac{4}{3}$ in $1\frac{1}{3}$, $3\frac{3}{4}$ times.

19. 20 dollars was $\frac{4}{5}$ of what he paid; 5 dollars was $\frac{1}{5}$, and 15 dollars was the whole.

21. In 1 hour, the first tap will let off $\frac{1}{3}$ of the contents, and the second, $\frac{1}{4}$. $\frac{1}{3}$ is equal to $\frac{4}{12}$, and $\frac{1}{4}$ is equal to $\frac{3}{12}$. Then both taps, in 1 hour, will let off $\frac{4}{12}$ plus $\frac{3}{12}$, which is $\frac{7}{12}$ of the contents. They will discharge the cistern in $1\frac{1}{7}$

many hours, as there are times $\frac{1}{3}$ in $\frac{3}{5}$. 12 in 35, $21\frac{1}{5}$ times.

26. $\frac{1}{4}$ is equal to $\frac{3}{12}$, $\frac{1}{3}$ is equal to $\frac{4}{12}$, $\frac{1}{6}$ is equal to $\frac{2}{12}$. Then, $\frac{3}{12}$ plus $\frac{4}{12}$ plus $\frac{2}{12}$ is $\frac{9}{12}$, or $\frac{3}{4}$. Hence 36 scholars must be $\frac{1}{4}$ of the school. 4 times 36 scholars are 144 scholars.

27. The shadow of the post is equal to $\frac{3}{4}$ of the height of the post; therefore, the shadow of the steeple is equal to $\frac{3}{4}$ of the height of the steeple. If 90 feet be $\frac{3}{4}$ of the height of the steeple, $\frac{1}{3}$ of 90 feet, which is 30 feet, is $\frac{1}{4}$ of the height. 30 feet being $\frac{1}{4}$ of the height, 4 times 30 feet, or 120 feet is the whole height.

32. The hound gains 3 rods by running 10 rods; and since he has 35 rods to gain, he must run as many times 10 rods, as there are times 3 rods in 35 rods. 3 in 35, $11\frac{2}{3}$ times. 11 times 10 is 110; $\frac{1}{3}$ of 10 is $3\frac{1}{3}$, $\frac{2}{3}$ of 10 is $6\frac{2}{3}$. 110 plus $6\frac{2}{3}$ is $116\frac{2}{3}$.

34. 5 dollars, which was the price of the bridle, was a certain part of the whole cost; the price of the saddle was 3 such parts, and the price of the horse was 27 such parts. 1 part plus 3 parts plus 27 parts are 31 parts. Then, 31 times 5 dollars, or 5 times 31 dollars, are 155 dollars.

36. $\frac{1}{2}$ of what he had, plus $\frac{1}{4}$, is equal to $\frac{3}{4}$ of what he had. What he had was $\frac{4}{4}$, and as much more is $\frac{1}{4}$. Then $\frac{4}{4}$ plus $\frac{1}{4}$ plus $\frac{1}{4}$ is $\frac{6}{4}$. Hence 70 cents is $\frac{1}{6}$ of what he had. If 70 be $\frac{1}{6}$ of some number, $\frac{1}{6}$ of 70 must be $\frac{1}{6}$ of that number; $\frac{1}{6}$ of 70 is $6\frac{4}{3}$; 4 times $6\frac{4}{3}$ is $25\frac{2}{3}$.

37. The expense of the whole for 1 week, was $\frac{1}{5}$ of 85 dollars, which is 17 dollars. The servant's board cost a certain part of 17 dollars, the son's board cost 3 such parts, and the father's cost 6 such parts. 1 part plus 3 parts plus 6 parts are 10 parts. Then the servant's board cost $\frac{1}{10}$ of 17 dollars, which is $1\frac{7}{10}$ dollar. The son's board cost 3 times $1\frac{7}{10}$ dollar, which is $5\frac{1}{10}$ dollars. The father's board cost twice $5\frac{1}{10}$ dollars, which is $10\frac{1}{5}$ dollars.

ANSWERS

TO

EXAMPLES IN WRITTEN ARITHMETIC.

PART SECOND.

CHAPTER I.

SECTION 1.

- | | |
|---|--|
| 1. Five hundred and eight. | 13. Nine million, seventy thousand, six hundred and thirty-eight. |
| 2. Three thousand eight hundred and sixty-one. | 14. Three million, eighteen thousand, one hundred and three. |
| 3. One thousand and fifty. | 15. Sixteen million, nine hundred seventy-four thousand, and thirty-six. |
| 4. Twenty-seven thousand and four hundred. | 16. Three hundred forty million, seven thousand, one hundred and forty. |
| 5. Thirteen thousand, and eight. | 17. Thirty-one million, thirty one thousand, and thirty-two. |
| 6. Twenty-nine thousand, one hundred and eleven. | 18. Nine million, nine hundred and eight thousand. |
| 7. One hundred twelve thousand, and six hundred. | 19. One million and one. |
| 8. Thirty thousand, and thirty. | 20. Ninety thousand, and forty. |
| 9. Two hundred six thousand, and two hundred and nine. | 21. One hundred seven thousand, and ninety. |
| 10. Five hundred thousand, and eighty-eight. | 22. Six million, three hundred and four. |
| 11. Seven million, four hundred thirty-two thousand, and forty. | |
| 12. Two hundred thousand, and five. | |

- | | |
|--|---|
| 23. Seventy-seven million, and ten thousand. | 30. Fifty billion and thirty six. |
| 24. One hundred million, one hundred thousand, and eleven. | 31. One billion, seven hundred thousand, and seven. |
| 25. Two hundred twenty thousand, and two. | 32. Eight trillion, four hundred billion, fifty-two million, and six hundred. |
| 26. Eleven million, three hundred thirty-three thousand, one hundred and eleven. | 33. Eight billion, six hundred thirty-one million, and eight thousand. |
| 27. Two hundred sixteen million, ninety thousand, and nine hundred. | 34. Twenty-two million, and four. |
| 28. Ten million, and four. | 35. Nine hundred nineteen billion, and sixty. |
| 29. Eight billion, and five hundred. | 36. Eighty-six trillion, one million, one hundred thousand, and eighteen. |

SEC. 2.

1. 70	13. 700 009
2. 48	14. 13 016 019
3. 124	15. 105 002 001
4. 609	16. 6 040 006 000
5. 3 600	17. 21 100 000 000
6. 2 450	18. ... 5 014 070 001 236
7. 19 068	19. . 122 000 000 847 000
8. 5 731	20. 10 000 987 730
9. 36 740	21. . 700 000 000 036 000
10. 268 000	22. 12 000 842 780
11. 905 100	23. . 29 809 000 001 018
12. 18 735	24. . . 823 010 008 015

CHAP. II.

SEC. 1.	SEC. 2.	
1. Performed.	1. Performed.	6. 214
2. 158	2. 21620	7. 1088
3. 1499	3. 27597	8. 934
4. 19897	4. 21106	9. 4389
5. 99879	5. 23273	10. 4887
		11. 92054

12. 450 518	20. 11907 dollars.	28. 319 dollars.
13. 5958	21. 2490 dollars.	29. 9610 dollars.
14. 8 860 705	22. 3334	30. 500 sheep.
15. 41 679 451	23. 976 dollars.	1825 dollars
16. 568 dollars.	24. \$39399	31. 2 576 406
17. 1733 dollars.	25. * * * *	32. 21 319 643 in
18. 382 acres.	26. 1799	33. 12 856 092 in.
19. 340 miles.	27. 7454 dollars.	

CHAP. III.

SEC. 1.		
1. Performed.	9. 34049	26. 766
2. 13	10. 25	
3. 426	11. 38	SEC. 3.
4. 1043	12. 101	1. 82 dollars.
5. 701 423	13. 26620	2. 255 dollars.
6. 223 sheep.	14. 9956	3. * * * *
7. 132 dollars.	15. 615 dollars.	4. 1955 dollars.
	16. 6516 dollars.	5. 11450 dollars.
	17. 1 017 537	6. sum 173.
	18. 500 000 in.	rem. 130
	19. 10 500 000 in.	7. 292 barrels.
	20. 8940 feet.	8. lost 1 dollar.
	21. 1405 dollars.	9. 39016
	22. 318 dollars.	10. 447 dollars.
	23. * * *	11. A. D. 1706
	24. * *	12. 57 dollars.
	25. 6 casks.	13. 7 013 006 200
	777 gallons.	

CHAP. IV.

SEC. 1.	SEC. 2.	
1. Performed.	1. Performed.	8. 85 cents.
2. 244	2. 20944	9. 150 dollars.
3. 1048	3. 3816	10. 805 dollars.
4. 27396	4. 30875	11. 72
5. 1 680 484	5. 29120	12. 144
6. 690 bushels.	6. 93 cents.	13. 1710
7. 2048	7. 96 cents.	14. 45178
		15. 128 72A

16. 4 226 220	16. 10875 dollars.	7. 295 200
17. 2008	17. 1924 dollars.	8. 189 120
18. 1900	18. 1222 miles.	9. Performed.
19. 18516	19. 48564 dollars.	10. 2 008 800
20. 122 800	20. 32870 times.	11. 68 490 000
21. 3 010 273	21. 1175 dollars.	12. 38 760 000
22. 63 000 045	22. 2655 dollars.	13. 50
23. 214 310 000	23. 77 pieces.	14. 1700
24. 3 712 257 236	2233 yards.	15. 49000
25. 48	24. 378 yards.	16. 600 cents.
26. 245	2268 dollars.	17. 2500 cents.
27. 2455	25. 2520 dollars.	18. 7000 cents.
	26. 139 520 rods.	19. Performed.
	27. 401 600 rods.	20. \$456
	28. 11904 dollars.	21. 9288 miles.
	29. 61320 miles.	22. 1148 bushels.
	30. 216 days' w.	23. 15300
	31. 216 days.	24. 34020
	32. 611 days.	25. 126 315
	33. 198 men.	26. 8000 dollars.
	34. 182 days.	27. 528 750 let.
		28. 13734 trees.
		13 830 138 ap
		29. 600 days.
		30. 1000 men.
		31. 81900 fishes.
		32. 811 188 378

Sec. 3.

1. Performed.
2. 1200
3. 28530
4. 207 333
5. 5 508 426
6. 34 716 681
7. Performed.
8. 40 033 592
9. 143 370
10. 7 153 515
11. 764 032
12. 36 128 144
13. 486 920
14. 887 124
15. 513 trees.

Sec. 4.

1. Performed.
2. 2 933 904
3. 57 963 906
4. 742 495 485
5. Performed.
6. 55300

CHAP. V.

Sec. 1.

1. Performed.
2. 2
3. 23
4. 312
5. 1221
6. 23 sheep.
7. 212 barrels

Sec. 2.

1. Performed.
2. 8 times.
3. 71 times.
4. 81 times.
5. 812 times.
6. 523 times.
7. 42 wagons.

8. 82 yards.
9. 41 hours.
10. 23
11. 32
12. 81
13. Performed.
14. 121 times.
15. 112 times.

16. 321 times.
 17. 132 times.
 18. 1683 times
 19. 317
 20. 753
 21. Performed
 22. 203 times.
 23. 203 times.
 24. 803 times.
 25. 320 times.
 26. 1500 times.
 27. 13 barrels.
 28. 67 sheep.
 29. 64 tons.
 30. 35 yards.
 31. 1427 soldiers.
 32. 492 muskets.
 33. 19 dollars.
 34. 19 dollars.
 35. 19 biscuit.
 36. 59 trees.
 37. 62 fishes.
 38. 197 dollars.
 39. 56 miles.
 40. 242 dollars.
 41. 29668 dollars.
 42. 457 men.
 43. 6 men.
 44. 6
 45. 16 dollars.
 46. 16
 47. 18
 48. Performed
 49. 9
 50. 1178

56. 19 suits.
 1 yard over.
 57. 772 times;
 5 over.
 58. 1143 times,
 6 over.
 59. 81 quo. 1 rem.
 60. 279 quotient.
 61. 80 quo. 4 rem.
 62. 18 quo. 1 rem.
 63. 163 quo. 2 re.

SEC. 3.

1. Performed.
 2. 1432 times,
 3 over.
 3. 12672 times.
 4. 16257 times,
 5 over.
 5. 2685 750 ti.
 1 over.
 6. 2177 245 ti.
 3 over.
 7. 1291 416 ti.
 8. Performed.
 9. 8781 times,
 1 over.
 10. 7802 times,
 5 over.
 11. 150 250 times.
 12. 23090 times,
 5 over.
 13. Performed.
 14. 696 times,
 4 over.
 15. 1309 times,
 2 over.
 16. 17 times,
 1 over.

18. 1391 times,
 17 over.
 19. 9315 times,
 54 over.
 20. 2 times.
 21. 21 ti. 309 ov.
 22. 193 ti. 239 ov
 23. 2 times
 24. 66 ti. 160 ov.
 25. Performed.
 26. 118 quo.
 451 rem.
 27. 45414 quo
 6 rem.
 28. 174 quo.
 50 rem.
 29. 115 quo.
 446 rem.
 30. 18541 quo.
 27 rem.
 31. 636 quo.
 125 rem.
 32. 46288 quo.
 3 rem.
 33. 319 quo.
 174 rem.
 34. 14 quo. 587 r.
 35. 36944 quo.
 24 rem.
 36. 387 acres.
 37. 14 months.
 38. 68 days.
 39. 43 dollars.
 40. 7 doll. a day.
 41. 272 dollars.
 42. 82 hogsheds.
 43. 313 hhd.
 2 gals. left
 44. 16 pounds.
 45. 57 quo.
 320 rem.

Sec. 4.

- 1 Performed.
2. 122 335 times,
62 over.
3. 21 ti. 74 over.
4. 9 ti. 1578 ov.
5. 2015 ti. 3 ov.
6. 1126 times,
100 over.
7. 2 times.
8. 1304 quo.
37 rem.
9. 1418 quo.
89 rem.
10. 62 ti. 531 ov.
11. 22 ti. 263 ov.
12. 21 times,
3421 over.
13. 31 times,
6140 over.
14. 24 times.
15. 43 ti. 5 ov.
16. 40 times.
17. 7 ti. 48 ov.
18. 54 dollars.
19. 6 doll. 42 cts.
20. 19 doll. 37 cts.
21. Performed.
22. 158 quo.
23. 16 dollars.
24. 28 times.
25. 8 dollars.
26. 61 quo.
27. 17 quo. 27 r.
28. 3 quo. 24 r.
29. 60 quo. 2 r.
30. 31 quo. 3 r.
31. 135 barrels.
32. 129 acres.
33. 138 acres.

34. 30 days.
35. 105 hhd.
36. 23 hats. 3 dol.
37. 45 oxen.
15 dols.
38. 19096 pieces.
341 bales.
39. 37 dollars.
40. 148 trees.
41. 24 miles.
42. 1244 dollars.

Sec. 5.

1. 800 000 000 in.
2. 9 442 215 dol.
3. 190 years.
4. \$25 200 000
5. 3 days.
6. 36 days.
7. 11 875 000 m.
8. 886 144 m.
9. 133 clergy,
160 dol. over.
10. 293 dollars.
11. 2964 dollars.
12. 228 barrels.
13. 228 times.
14. 342 dollars.
15. 112 acres.
16. 112 times.
17. 254 dollars.
18. 40911 dollars.
19. lost 410 dol.
20. 1200 acres.
21. 21 dollars.
22. 18192 dols.
23. 1160 gallons.
24. 16 months.
25. 11 months.
26. 407 dollars.

27. 426 barrels.
28. 558 dollars.
29. 973 dollars.
30. 48 cows.
31. 208 dollars.
32. 8 cows.
33. 24 dollars.
34. 24
35. 169 miles.
36. 16hhd. 5bu.
37. 23 days.
38. 7 miles.
39. 17 oxen.
7 sheep.
40. 436 dollars.
41. 1376 notes.
42. 229 dollars.
43. 6886
44. 71
45. 9600

Sec. 6.

1. 8600 cents.
2. 758 cents.
3. \$37
4. \$5.34
5. Performed.
6. \$144.38
7. \$545.27
8. \$126.44
9. \$514.37
10. \$24.37
11. \$79.64
12. \$140.17
13. \$32.67
14. \$23.75
15. \$2.13
16. \$41.32
17. \$295.06
18. Performed.

19. \$129.48	40. \$6.40	61. 30 times.
20. \$5358.88	41. \$38.82	62. 46834 times.
21. \$50.58	42. \$28.75	63. 43 pencils.
22. 93 cents.	43. \$4.80	64. 17 pounds
23. \$753.95	44. \$18.60	65. 43 days.
24. \$3.85	45. \$11.76	66. 14 cents.
25. \$5.41	46. \$102.20	67. \$3.19
26. \$5.33	47. \$86	68. \$5.41
27. \$1.95	48. \$12.84	69. Performed.
28. \$16.50	49. \$10920.40	70. \$125.24
29. \$263.06	50. \$550.40	36 rem.
30. \$153.75	51. \$11297.70	71. \$28.75
31. \$133.20	52. \$13.80	72. \$1.58, and
32. Performed.	53. \$61.92	600 cts. or
33. \$4.32	54. \$294	6 dols. rem.
34. \$366.17	55. \$49.50	73. \$11.67
35. \$6	56. \$709.75	74. \$607.62
36. \$8	57. \$2144.52	6 rem.
37. \$8.17	58. Performed.	75. \$45.10
38. \$157 642.92	59. 337 times.	76. \$394.40
39. \$7.20	60. 74 times.	77. 825 bushels.

SEC. 8.†

1. Performed.	18. 176 firkins.
2. Performed.	19. 288 scruples.
3. 895 farthings.	20. 14lb 63 33
4. £9 11s. 9d. 3qr	21. 721 doses.
5. 1211 pence.	22. \$36.
6. 13s. 5d. 3qr.	23. 216 doses.
7. 97 times, 4 over.	24. 20 nails.
8. Performed.	25. 1015 yards.
9. Performed.	26. 1283 quarters.
10. 2436dwt.	427 Fl. ells, 2qr
11. 3lb. 5oz. 9dwt.	27. 12 nails.
12. 5268 grains.	28. 2920 yards.
13. 4lb. 1oz. 5dwt. 1gr.	29. 64 pints.
14. 2240 pounds.	30. 3775 pints.
15. 4042 589 drams.	31. 257bu 2pk.
16. 13T. 17cwt. 3qr. 14lb.	32. 70 bushels.
17. \$1166.79	33. 263bu. 1pk

34. 2016 gills.
35. 18hhd. 1gal. 2qt.
36. \$60.48
37. \$675.36
38. 2hhd. 10gal. 3qt. 1pt.
39. 648 pints.
40. 90kil. 1fir. 5gal. 2qt.
41. 1152 bottles.
42. 6 cents.
43. 6bl. 1kil. 3qts.
44. 1294 inches.
45. 273yd. 2ft. 7in. 1bar.
46. 16000 rods.
47. 21600 miles.
48. 70yd. 1ft. 9in.
49. 6yd. 0ft. 8in.
50. 104 square inches.
51. 448 square rods.
2A. 3R. 8r.
52. 72 square yards.
53. 64 cubic inches.
54. 3ft. 316in.
55. 86400 inches.
56. 300 cubic feet.
18ft. w. 12 c. ft.
2C. 2ft. w. 12 c. ft.
57. 128 cubic feet.
58. 31 536 000 seconds in a
common year
31 622 400 seconds in a
leap year.
31 556 928 seconds in a
solar year.
59. 82080 minutes.
60. 3 258 720 times.
61. 4 years 273 days

SEC. 9.

- 1 Performed.
- 2 £135 12s. 11d. 3qr.

3. £531 8s. 10d. 3qr.
4. £16 18s. 10d
5. 8lb. 11oz. 18dwt. 4gr.
6. 13lb. 5oz. 3dwt. 20gr.
7. 41T. 16cwt. 0qr. 21lb
1oz. 11dr.
8. 8T. 13cwt. 3qr. 9lb. 3oz
2dr.
9. 8lb 43 13 29 6gr.
10. 5lb 113 53 09 15gr.
11. 124yd. 3qr. 1na.
12. 303 E. ells, 0qr. 2na.
13. 1233bu. 1pk. 7qt. 1pt.
14. 972bu. 3pk. 3qt. 1pt.
15. 569hhd. 51gal. 3qt. 1pt.
16. 12T. 1p. 101gal. 2qt.
17. 48bl. 0kil. 0fir. 0gal. 1qt.
1pt.
18. 45bl. 1kil. 1fir. 0gal. 1qt
1pt.
19. 80yd. 1ft. 2in. 2bar.
20. 86m. 3fur. 28rd.
21. 122yd. 6ft. 129in.
22. 548A. 3R. 38rd.
23. 27T. 15ft. 754in.
24. 29C. 6ft. w. 6 c. ft.
25. 4Y. 144d. 2h. 29m. 39s
26. 19Y. 251d. 7h. 44m 43s

SEC. 10.

1. Performed.
2. £57 2s. 11d.
3. 6s. 7d. 1qr.
4. £780 16s. 1d. 3qr.
5. 1lb. 10oz. 10dwt.
6. 3lb. 3oz. 6dwt.
7. 8T. 4cwt. 2qr. 15lb.
8. 12T. 6cwt.
9. 1lb 03 53 09 4gr
10. 23 63

3. $\frac{2}{15}$ 169bu.
3pk. 4qt.
4. 342 barrels
5. 192 rods.
6. \$3800
7. 950 miles.
8. £31 15s. 3d.

SEC. 10.

1. 455 trees.
2. 455
3. \$195.69
4. \$195.69
5. 1750 pounds.
6. 1750
7. \$58.24
8. \$58.24
9. \$314.40
10. 75 pounds.

SEC. 11.

1. 14bu. 70bu.
2. \$7.50 \$60
3. \$60
4. 21m. 252m.
5. 252
6. \$5.75.
\$97.75
7. \$97.75
8. \$44.87
9. 528 miles
10. 216 men.
- 11 216
12. \$1840
- 13 \$120.75

SEC. 12.

1. $\frac{83}{100}$ of a dollar.
2. $\frac{14}{20}$ of a ton.
3. $\frac{3}{19}$ of his mon.
4. $\frac{15}{60}$ of an hour.
5. 1300 miles.
6. \$16.50
7. $\frac{1}{14}$ 5 books.
8. \$66
9. $\frac{6}{14}$ \$40.14
10. \$134.25
11. 39 shillings, or
£1 19s.

SEC. 13.

1. Performed.
2. $24\frac{1}{2}$ yards.
3. $24\frac{1}{2}$ times.
4. $127\frac{1}{2}$ barrels.
5. $127\frac{1}{2}$ times.
6. $21\frac{1}{2}$ bushels.
7. $21\frac{1}{2}$ hours.
8. $87\frac{5}{12}$ times.
9. $1969\frac{2}{39}$ times.
10. £ $21\frac{1}{20}$
11. $27\frac{2}{20}$ yards.
12. $13\frac{8}{34}$ tons.
13. $41\frac{1}{17}$ times.
14. $15\frac{2}{4}$ cwt.

SEC. 14.

1. Performed.
2. $\frac{3}{2}$ of a sheet
3. $\frac{89}{5}$ of a dollar.
4. $18\frac{6}{6}$ of a lb.

5. $\frac{584}{8}$ of a yard
6. $\frac{5769}{9}$ $\frac{6410}{10}$
7. 1134 miles.
8. Performed.
9. $\frac{457}{8}$ of a mile.
10. $\frac{1472}{17}$
11. $\frac{253}{3}$
12. 34 gallons.
- 13 159 yards.

SEC. 15.

1. Performed.
2. 24 sheets.
3. \$49
4. 22 pounds.
5. 152 yards.
6. 14 hours.
7. 13
8. 2120 pounds
9. Performed.
10. 354
11. \$63 $\frac{3}{8}$
12. 47 gallons
13. \$62 $\frac{3}{8}$
14. \$81 $\frac{3}{8}$

SEC. 16.

1. 4
2. Performed.
3. 9452 $\frac{1}{2}$
4. 11581
5. Performed.
6. 25674 $\frac{3}{4}$
7. 54194574 $\frac{1}{2}$
8. 31 $\frac{3}{8}$ yards.

9. $56\frac{1}{2}$ pounds.

SEC. 17.

1. $28\frac{1}{2}$ miles
2. $28\frac{1}{2}$
3. $15\frac{1}{2}$ yards.
4. $15\frac{1}{2}$
5. $22\frac{2}{3}$ pounds.
6. $22\frac{2}{3}$

SEC. 18.

1. Performed.
2. $293\frac{2}{3}$
3. $\$274\frac{2}{3}$
4. $142\frac{1}{2}$
5. $132583\frac{2}{3}$
6. Performed.
7. $188747\frac{2}{10}$
8. 1460
9. $1683\frac{1}{16}$ gall.
10. $\$3544\frac{7}{100}$
11. $3789\frac{6}{18}$ miles.
12. $8\frac{1}{2}$ times.
13. $\$27\frac{7}{100}$
14. $296\frac{2}{16}$ bu.

SEC. 19.

1. $\$34.37\frac{1}{2}$
2. $277\frac{2}{3}$ miles.
3. $15021\frac{7}{8}$
4. $180\frac{2}{3}$ yards.
5. $2749\frac{2}{13}$
6. $\$1$
7. $\$7\frac{1}{2}$

SEC. 20.

1. $\frac{2}{3}$ of $\$1$
2. $\frac{2}{3}$ of 1
3. $\frac{2}{3}$ of a barrel.
4. $\frac{2}{3}$ of 1
5. $\frac{10}{12}$ of 1 bushel.
6. $\frac{10}{12}$ of 1
7. $\frac{2}{39}$ $\frac{3}{39}$ $\frac{4}{39}$ $\frac{18}{39}$ $\frac{38}{39}$
8. $\frac{2}{3}$ of a bu.
 $9\frac{1}{2}$ bu.
9. $\frac{2}{3}$ $9\frac{1}{2}$
10. $\frac{4}{3}$ $8\frac{2}{3}$
11. $\frac{2}{13}$ $2\frac{2}{13}$
12. $\frac{721}{6}$ of $\$1$.
 $\$120\frac{1}{6}$

SEC. 21.

1. $\$28\frac{1}{4}$
2. $28\frac{1}{4}$
3. $153\frac{2}{3}$ acres.
4. $219\frac{1}{6}$ $66\frac{2}{3}$
 $911\frac{2}{3}$
5. $\$45.93\frac{4}{12}$
6. $4593\frac{4}{12}$ $34\frac{1}{2}$
 $16\frac{1}{2}$
7. $16\frac{8}{25}$ pages.
8. $3\frac{2}{3}$ shillings.
9. $15\frac{5}{8}$ shillings.
10. $7\frac{4}{8}$ pence.
11. $14\frac{4}{10}$ grains.
12. 8 drams.
13. $51\frac{6}{11}$ gallons.
14. $17\frac{2}{16}$ rods.
15. $123\frac{2}{3}$ sq. in.
16. 3000 seconds.

17. $\$23.31$

SEC. 22

1. $38\frac{3}{4}$ bu.
2. $38\frac{3}{4}$
3. $\$61\frac{1}{8}$
4. $61\frac{1}{8}$ $457\frac{8}{10}$
 $96\frac{6}{14}$ 57365
5. $\$2$
6. $132\frac{1}{16}$ lb.
7. $\$118\frac{2}{12}$
8. $55\frac{1}{2}$ bushels.
9. 37 bu. 1 pk. 0 qt.
1 pt.

SEC. 23

1. $\$1.35\frac{2}{3}$
2. $\$4.06\frac{2}{3}$
3. $\$13.28\frac{1}{4}$
4. $\$66.42\frac{1}{2}$
5. $470\frac{5}{8}$ $2823\frac{1}{2}$
6. 14 gal. 98 gal
7. $16675\frac{2}{3}$ feet.
8. $1333\frac{2}{3}$ miles
9. $\$750$
10. $\$10.71\frac{2}{3}$
11. $\$136.50$
12. $284\frac{1}{2}$ rods
13. 84375 lb.
14. $8437\frac{1}{2}$
15. $2012\frac{2}{3}$ miles
16. $2012\frac{2}{3}$
17. $582\frac{2}{3}$ $1232\frac{2}{3}$
 $935\frac{2}{3}$ $4764\frac{1}{2}$
 $16332\frac{6}{10}$

18. Performed.

19. 1 2

20. \$7

21. \$155

22. \$255

23. \$5.55

24. \$5.31

25. $25\frac{13}{100}$ gal.

26. Performed.

27. \$176.19

28. \$3.60

29. $\$2.80\frac{56}{100}$ 30. $\$42.34\frac{14}{100}$ 31. $\$530.23\frac{85}{100}$

32. A, \$470.

B, \$530

33. 31 cents.

34. \$2.79

35. 82 cents.

36. \$13.12

37. \$535.19

38. \$4.80

39. $\$6.24\frac{15}{100}$

40. \$4.76

41. \$347.10

42. \$5 \$105

43. 5cts. \$1.05

44. \$21.24 for 1Y.

\$42.48 for 2Y

\$63.72 for 3Y.

\$84.96 for 4Y.

Am. \$438.96

45. \$9.72

\$50.22

46. \$3.78

\$21.78

47. \$13456

48. \$1067.55

\$7537.55

49. $17\frac{6}{12}$ cents.\$35.17 $\frac{6}{12}$ 50. $24\frac{6}{12}$ cents.51. $\$53.63\frac{3}{4}$ 52. $\$1.63\frac{8}{12}$ for 4\$2.04 $\frac{7}{12}$ for 5\$2.45 $\frac{6}{12}$ for 6\$2.86 $\frac{5}{12}$ for 7\$3.27 $\frac{4}{12}$ for 8\$3.68 $\frac{3}{12}$ for 9\$4.09 $\frac{2}{12}$ for 10\$127.25 $\frac{1}{12}$ am.53. $94\frac{3}{12}$ cents.54. $\$4.87\frac{1}{2}$ 55. $\$530.13\frac{1}{2}$ 56. $\$10.61\frac{2}{3}$

57. \$110.41

58. \$17.01

59. $\$177.62\frac{1}{2}$

60. \$36.52, first ;

\$79.16 $\frac{1}{2}$, sec.

61. 26 cents.

62. 12 cents.

63. 88 cents.

64. \$2.89

65. \$2.69

66. \$17.51

67. \$420.70

68. \$190.23

69. \$9.52

70. \$4.82

71. \$28.38

72. \$7.32

73. \$3.11

74. \$20.38

75. 8 cents.

76. $\$6.32\frac{17}{25}$ 77. $\$13.98\frac{6}{10}$ 78. $\$141.50\frac{50}{100}$ 79. $\$1490.90\frac{1}{10}$ 80. $33\frac{1}{3}$ cents.81. $\$64.37\frac{17}{100}$

Sec. 24.

1. $\$39.62\frac{1}{3}$ \$158.49 $\frac{1}{3}$ 2. 15849 $\frac{1}{3}$

3. 50cts. \$6

4. $81\frac{3}{4}$ bu.. 212 $\frac{1}{2}$ bu.5. 22677 $\frac{1}{2}$ 6. $\$271.42\frac{1}{2}$

7. \$175

Sec. 25.

1. $\frac{15}{24}$ 2. $\frac{6}{14}$ 3. $\frac{18}{18}$ or 14. $\frac{22}{43}$ 5. $\frac{13}{40}$

Sec. 26.

1. $\frac{1}{2} \frac{2}{3} \frac{1}{4} \frac{3}{4} \frac{2}{3} \frac{1}{4}$ $\frac{2}{3} \frac{1}{2}$ 2. $\frac{1}{5} \frac{1}{4} \frac{1}{3} \frac{3}{4} \frac{1}{10}$ $\frac{1}{2} \frac{1}{40}$

3. Performed.

4. 5

5. $\frac{21}{21}$ 6. $\frac{1}{2} \frac{1}{4} \frac{1}{8} \frac{1}{16}$

SEC. 27.

1. $\frac{1}{3}$
2. $\frac{1}{2\frac{1}{2}}$
3. $\frac{1}{2}$
4. $\frac{7}{16}$ of an acre.
5. $\frac{28}{45}$
6. $\frac{5}{14}$ of 1
7. $\frac{27}{187}$
8. $\frac{1}{12}$ of 1s.
 $\frac{1}{240}$ of £1
9. $\frac{7}{240}$ of £1
10. $\frac{1}{48}$ of an oz.
11. $\frac{3}{16}$ of a yard.
12. $\frac{1}{4}$ of a yard.
13. $\frac{1}{144}$ of an h.
14. $\frac{1}{10}$
15. $\frac{3}{25}$ of 1
16. $\frac{2}{169}$
17. Performed.
18. $\frac{25}{192}$ of £1
19. $\frac{47}{960}$ of £1
20. $\frac{241}{320}$ of £1
21. $\frac{41}{48}$ of a shill.
22. $\frac{679}{4800}$ of £1
23. $\frac{1}{28}$ of £1
24. $\frac{11}{64}$ of a bu.
25. $\frac{79}{504}$ of 1 hhd.
26. $\frac{1}{48}$ of a mile.
27. $\frac{13}{32000}$ of a day.
28. Performed.
29. 13s. 4d.
30. 8s. 10d. $2\frac{3}{4}$ qr.
31. 4d. 2qr.
32. £15 11s. 5d.
0 $\frac{1}{4}$ qr.
33. $3\frac{3}{4}$ qr. 3lb. 1oz.

12 $\frac{1}{2}$ dr.

34. 9lb. 9oz. $9\frac{3}{4}$ dr.
35. 4fur. 17r. 12ft.
10in.
36. 10A. 1R. 5r.
194ft. $66\frac{5}{7}$ in.
37. 5 dimes, 8 cts.
 $3\frac{1}{3}$ mills.
38. 45cts. $4\frac{6}{11}$ mi.
39. 9cwt. 1qr. 19lb.
10oz. $10\frac{2}{3}$ dr.

SEC. 28.

1. Performed.
2. $\frac{60}{150}$ $\frac{60}{150}$ $\frac{50}{150}$
3. $\frac{165}{210}$ $\frac{84}{210}$
4. $\frac{120}{240}$ $\frac{60}{240}$ $\frac{152}{240}$
5. $\frac{240}{420}$ $\frac{140}{420}$ $\frac{168}{420}$
6. $\frac{50}{420}$
7. $1\frac{147}{425}$
8. $1\frac{125}{350}$
9. $\frac{17}{60}$
10. $\frac{8}{51}$
11. $\frac{7}{18}$ is $\frac{5}{198}$ gr'er.

SEC. 29.

1. $380\frac{7}{24}$ bu.
2. $160\frac{19}{460}$ acres.
3. $3063\frac{121}{520}$
4. $2\frac{4}{21}$
5. $1221\frac{13}{20}$
6. $46\frac{51}{72}$ gal.
7. $287\frac{41}{420}$
8. $\frac{37}{91}$ of the loaf.
9. $6\frac{17}{80}$ barrels.

SEC. 30

1. 24 men.
2. 24 times.
3. 24 pairs.
4. 24
5. 115
6. $13\frac{1}{3}$ miles.
7. $13\frac{1}{3}$ times.
8. $31\frac{1}{6}$ times.
9. $44\frac{4}{5}$ times.
10. $73\frac{3}{5}$ barrels.
11. $3\frac{26}{181}$ times.
12. $6\frac{98}{265}$ times.
13. $24\frac{6}{57}$ barrels.

SEC. 31.

1. $454\frac{1}{95}$ days.
2. 117 pounds.
3. \$4.68 $\frac{3}{4}$
4. $37\frac{1}{4}$ yards.
5. \$2 $\frac{11}{20}$
6. $4847\frac{1}{2}$ bushels
7. \$554.96 $\frac{4}{10}$
8. $\frac{71}{6}$ $11\frac{5}{6}$
9. \$23.80 $\frac{10}{42}$
10. $197\frac{2}{14}$ cords
11. $177\frac{1}{7}$ days.
12. $77\frac{1}{7}$ days.
13. $\frac{6}{9}$ $\frac{24}{36}$ $\frac{70}{70}$
14. $1\frac{6}{13}$
15. $82\frac{1}{72}$ acres.
16. $141\frac{32}{7735}$
17. $\frac{7}{45}$
18. $184\frac{86}{791}$ hours.
19. $\frac{361}{366}$
20. $1\frac{1}{100}$

21. 3808 $\frac{103}{233}$
 22. 27931 $\frac{1}{7}$
 23. $\frac{1176}{2255}$
 24. $12\frac{55}{384}$
 25. 4981 $\frac{1}{11}$
 26. $12\frac{8}{103}$

SEC. 32

1. 11d. 8h.

2. \$1.66 $\frac{2}{3}$ 3. 8 $\frac{23}{24}$ cents.4. 37bu. 1pk. 6qt.
0 $\frac{56}{62}$ pt.

5. \$1162

6. 552 $\frac{72}{219}$ men.7. \$40.90 $\frac{10}{11}$

8. \$1323

9. A, \$236.60

B, \$263.90

10. 13 $\frac{5}{7}$

11. To A. 622m.

To D. 520m.

To St. L. 884m.

To N. 1394m.

To N. O. 1468m.

From N. O. to

A. 2090m.

12. Each will be as follows.

	d.	h.	m.	s.
Baltimore,		5	25	42 $\frac{6}{7}$
Philadelphia,	1	9	42	51 $\frac{3}{7}$
New York,	3	2	34	17 $\frac{1}{7}$
Hartford,	5	0	8	34 $\frac{2}{7}$
Boston,	6	4	25	42 $\frac{6}{7}$
Portland,	8	1	17	8 $\frac{4}{7}$
Augusta, Me.	8	8	51	25 $\frac{3}{7}$
Albany,	5	4	8	34 $\frac{2}{7}$
Montpelier,	8	7	17	8 $\frac{4}{7}$
Pittsburgh,	3	1	25	42 $\frac{6}{7}$
Buffalo,	5	4	17	8 $\frac{4}{7}$
Detroit,	7	4	17	8 $\frac{4}{7}$
Wheeling,	3	7	42	51 $\frac{3}{7}$
Cincinnati,	7	0	34	17 $\frac{1}{7}$
Vandalia,	11	3	25	42 $\frac{6}{7}$
St. Louis,	12	6	17	8 $\frac{4}{7}$
Louisville,	8	6	17	8 $\frac{4}{7}$
Nashville,	11	6	17	8 $\frac{4}{7}$

	d.	h.	m.	s.
Tuscaloosa,	14	9	8	34 $\frac{2}{7}$
Natchez,	19	9	8	34 $\frac{2}{7}$
Richmond,	1	7	34	17 $\frac{1}{7}$
Raleigh,	4	1	8	34 $\frac{2}{7}$
Charleston,	7	7	42	51 $\frac{3}{7}$
Savannah,	9	3	51	25 $\frac{3}{7}$
Tallahassee,	14	1	8	34 $\frac{2}{7}$
Mobile,	18	6	51	25 $\frac{3}{7}$
New Orleans,	20	9	42	51 $\frac{3}{7}$
Norfolk,	3	3	51	25 $\frac{3}{7}$
Augusta, Ga.	8	2	34	17 $\frac{1}{7}$

13.

14. Between Charleston and Raleigh. 121 miles from C., 135 miles from R.

15. Between Boston and Hartford; 57 miles from Boston.

16. A, \$142.85 $\frac{5}{7}$ B, \$285.71 $\frac{3}{7}$ C, \$571.42 $\frac{6}{7}$

17. 10lb. sulphur.

14lb. charcoal.

76lb. nitre.

18. A's, \$2.81 $\frac{1}{4}$ B's, \$2.18 $\frac{3}{4}$ 19. C's, \$88.78 $\frac{2}{3}$ D's, \$57.21 $\frac{1}{2}$

20. \$80.73

21. E. 113A. 0R.

12 $\frac{4}{13}$ r.

F, 131A. 3R

21- $\frac{2}{3}$ r.

22. 237 500 famil.	11 $\frac{23}{47}$ days.	39. 4 $\frac{1}{2}$ times greater
23. 8 $\frac{2}{11}$ days.	32. $\frac{37}{50}$ of it.	than N. Y.
24. 5 $\frac{19}{17}$ days.	1b. 37m. 17 $\frac{31}{37}$ s.	6 $\frac{9}{11}$ times gr.
25. 6 $\frac{2}{3}$ days.	33. 176ft. 1 $\frac{3}{4}$ m.	than Phil.
26. 9 $\frac{2}{3}$ days.	34. \$43.27 $\frac{3}{11}$	13 $\frac{1}{23}$ times gr.
27. 20 yards.	35. 136 $\frac{4}{11}$ rods.	than N. O.
28. 5 $\frac{1}{2}$ yards.	36. 175 pounds.	13 $\frac{7}{11}$ times gr.
29. 26 yards.	37. 48	than Balt.
30. 3240 bricks.	38. A, \$16.66 $\frac{2}{3}$	14 $\frac{6}{11}$ times gr.
31. $\frac{47}{60}$ of 1A.	B, \$13.33 $\frac{1}{3}$	than Boston.

SUPPLEMENT.

ARTICLE I.

1. $\frac{4}{17}$.	3. $\frac{1}{16}$.*	5. $\frac{1}{16}$.
2. $\frac{43}{8}$.	4. $\frac{2}{27}$.	

* The learner may be shown, that when two equal numbers are cancelled, each contains the other once; and hence, a cancelled factor stands as the representative of 1, and must be regarded as 1 in the final multiplication, where the factors of either term are all cancelled off.

ART. II.

1. .3	.46	.708	.1642	.96041
2. 38.5	516.22	8.354	24.7636	
3. .04	.007	.0003	.00006	.000008

4 Six hundredths.

Eight thousandths.

Thirteen thousandths.

Five hundred and fourteen ten-thousandths.

Sixty-five thousandths.

Four hundred and nine thousandths.

Two hundred seven thousand, eight hundred and sixty two millionths.

Five thousand and four ten-thousandths.

Seven ten-thousandths.

Six thousand, two hundred and sixty-four hundred-thousandths.

Ten thousand, eight hundred and nine *hundred-thousandths*.

Six million, five hundred thousand, one hundred and seventy-one *ten-millionths*

24, and two *hundredths*.

5, and seven hundred sixty-three thousand, and eighty four *millionths*.

160, and fifty-two *thousandths*.

712, and three thousand and five *ten-thousandths*

5. 9.06	21. 643.2	48. .5
8.014	22. \$3.60	49. .666+
3.101	23. \$17.82	.25
46.051	24. \$73.296	.75
7.0305	25. \$258.30	.65
65.007	26. \$78.213	.277+
12.0016	27. \$.0063	.4166+
200.006	28. \$20.424	.378+
1.4006	29. 3012.41164	.069+
60.008	30. 1906.872	50. \$.562+
8.040607	31. .03068019	51. \$48.714+
26.0000015	32. 2.6303262	52. £316.625
6. Performed.	33. .0028	53. £.375
7. 1821.1316	34. .000045	54. £.75
8. 3850.7995	35. .04230	55. .5625 of 1s.
9. 38.729	36. Performed.	56. £.1489+
10. 54.645	37. Performed.	57. .0208+ of 1s.
11. Performed.	38. Performed.	58. £18.1291+
12. 7327.464	39. 2456.7	59. .737+ of 1oz.
13. 4518.3426	40. .004319+	60. .1406 of 1bu.
14. 15947.8294	41. 378 000	61. .937+ of 1gal
15. .72	42. 46.27	62. .0333+ of 1m
16. .13933	43. 3.153+	63. \$226.367+
17. .954	44. .365	64. Performed.
18. \$3.403	45. 1.184+	65. 8s. 0d. 3qr.+
19. \$9.927	46. .1	66. 10d. 1qr.+
20. Performed.	47. Performed.	67. 15cw. 22lb.

6oz. 6dr. +	78. \$143.229 $\frac{1}{6}$	25. 44 $\frac{11}{16}$ pr. cent.
68. 5h. 1m. 32s.	79. \$1.687 $\frac{1}{2}$	26. £1 7s. 0d. 2
69. 2R. 11r. 54ft. +	80. \$64.716 $\frac{1}{5}$	qr. +
70. £15 5 9 3	81. \$2.522 $\frac{2}{15}$	27. £1 13s. 5d. +
71. 16 cts. 6 $\frac{2}{3}$ ms.	82. \$38.338 $\frac{4}{5}$	28. 6s. 2d. +
33 cts. 3 $\frac{1}{3}$ ms.	83. \$3.607 $\frac{1}{14}$	29. \$12.50
50 cents.	84. \$234.200 $\frac{11}{14}$	30. \$21.765
66 cts. 6 $\frac{2}{3}$ ms.	85. \$85.862 $\frac{2}{5}$	31. \$131.62
83 cts. 3 $\frac{1}{3}$ ms.	86. 24.962 $\frac{8}{9}$	32. \$1050
72. 12 cts. 5ms.		33. \$755.625
25 cents.		34. \$6320
37 cts. 5ms.	ART. III.	35. \$485.40.
50 cents.	1. Performed.	36. \$12.975
62 cts. 5ms.	2. \$1. \$8.34	37. \$36.625
75 cents.	3. \$3. \$1.26	
87 cts. 5ms.	4. \$7. \$75.95	ART. IV.
73. 13 cts. 3 $\frac{1}{3}$ ms.	5. \$31.86	1. Performed.
26 cts. 6 $\frac{2}{3}$ ms.	6. \$444.48	2. \$154.56
40 cents.	7. Performed.	3. 38 cents.
53 cts. 3 $\frac{1}{3}$ ms.	8. \$1 31	4. 60 cents.
66 cts. 6 $\frac{2}{3}$ ms.	9. \$1.52	5. 39+cents.
80 cents.	10. \$1.25	6. \$2.19+
74. 21 cts. 4 $\frac{2}{3}$ ms.	11. \$4.687 $\frac{1}{2}$	7. \$112.83+
42 cts. 8 $\frac{4}{7}$ ms.	12. \$21.50	\$865.08+
64 cts. 2 $\frac{4}{7}$ ms.	13. Performed.	8. 19s. 8d. 2qr. +
85 cts. 7 $\frac{1}{7}$ ms.	14. \$27.04	£17 8s. 2d. 2
75. 20 cents.	15. \$2.533 $\frac{1}{3}$	qr. +
40 cents.	16. \$75.075	9. \$7.84
60 cents.	17. \$1.558 $\frac{1}{3}$	10. \$1.88+
80 cents.	18. Performed.	11. \$10.87+
100 cents.	19. \$89.871+	12. \$12.70
76. 22 cts. 2 $\frac{2}{3}$ ms.	20. \$1.564+	13. \$92.16+
44 cts. 4 $\frac{4}{3}$ ms.	21. \$17.085	\$448.25+
66 cts. 6 $\frac{4}{3}$ ms.	22. Performed.	14. \$65.16+
88 cts. 8 $\frac{8}{3}$ ms.	23. 13 $\frac{1}{3}$ pr. cent.	15. \$14.86+
77. \$2.25	24. 58 $\frac{1}{3}$ pr. cent.	

16. \$16.02+
17. \$16.20+
\$266.20+
18. \$116.40+
19. \$17.12+
20. \$24.95+
21. \$18.73+
22. Performed.
23. \$160.63+
24. Performed.
25. \$209.06+
26. Performed.
27. \$148.57+
28. \$77.69+
29. \$574.32+
30. \$656.06+

ART. V.

1. Performed.
2. \$429.17+
3. \$117.17+
4. \$2354.32+

ART. VI.

1. \$6.14+
2. \$13.95
3. \$2501.73+
4. \$435.95+

ART. VII.

1. \$35 profit.
31½ per cent.
2. \$6.30 per yd.

3. Lost 15 pr. ct.
4. \$5.625 pr. bl.
5. 90 cts. pr. bu.
6. \$3.773 $\frac{1}{13}$
7. Lose 1 pr. ct.

ART. VIII.

1. Performed.
2. W, \$625
S, \$500
L, \$375
3. A, \$160
B, \$100
C, \$60
D, \$30
4. A, \$2280
B, \$1584
C, \$2536
5. A, \$180
B, \$90
C, \$50
6. X, \$450
Y, \$247
Z, \$121.50
7. Gould, \$352.50
Davis, \$330.00

8. A, \$11.25
B, \$20.00
C, \$29.25

ART. IX.

1. \$131.565
2. \$374.87

ART. X.

1. Performed.
2. \$21
3. 496 yds.
4. \$401.50
5. 28 workmen
6. 21 bushels.
7. \$2.25
8. 113½ feet
9. 72 yards.
10. 8 days.
11. \$78.75
12. \$6.48
13. 50 yards.
14. 56 pounds.
15. \$20
16. \$1794.375
17. \$1712.746+
18. \$0.75
19. 6½ $\frac{6}{7}$ ounces.
20. \$22.222 $\frac{2}{3}$
21. 5m. 25d.
22. 907½ pounds.
23. \$1266.666 $\frac{2}{3}$
24. \$27

ART. XI.

1. 16 sq. ft.
2304 sq. in.
2. 12 sq. r.
3267 sq. ft.
3. 3675 sq. r.
22 A. 3 R. 35 r
4. 206.979635+
sq. in.

5. 15912 c. in.	18. \$15.079+	3. 1176 sq. ft. 1'
6. 3619.11168+ c. in.	19. 98.26+ perch- es.	6"
7. 66 sq. yds.	20. 66.00512+ perches.	4. 44 sq. ft. 0' 10"
8. 6821.05+ bricks.	21. 673 $\frac{1}{2}$ gal.	5. 1102 sq. ft. 10'
9. 8640 shingles.	22. 60 bushels.	6"
10. 774 $\frac{1}{2}$ clap- boards.	23. 24.24489+ gal.	6. 79 sq. ft. 11' 0'
11. 550.375 sq. ft.	24. 1248 gal.	6" 6" 6" 6"
12. 280 sq. ft.	25. 136.77359+ gal.	7. 126 sq. ft. 3' 6'
13. 25.2 sq. ft.	26. 35.49866+ gal.	9" 5" 5" 5"
14. 35.53+ sq. ft.		8. 745 sq. ft. 6' 10"
15. 1.31944+ ton, or 1 T. 16 ft. 96 in.	ART. XII.	2" 4"
16. $\frac{3025}{3075}$ of a ton, or nearly 1 T.	1. 66 sq. ft. 4' 6"	9. 233 sq. ft. 4' 5"
17. 24 $\frac{1}{4}$ squares.	2. 10 sq. ft. 2' 10"	9" 6" 4" 6"
		6" 6"
		10. 1310 sq. ft. 9'
		11. 73 $\frac{2}{3}$ sq. yd.
		12. 43 yards.
		13. \$3.57 $\frac{8}{9}$
		14. 206 $\frac{2}{3}$

¶ Scholars who have been through the exercises of PART SECOND, and who have opportunity to pursue the study of arithmetic still further, will find PART THIRD to be the most appropriate book for their purpose — it is prepared especially for their case. If they should now enter upon any other system, they must either waste several months in the elementary part of the treatise, or, must strike into the midst of the work, at a point from which they cannot advance without frequent assistance from the teacher. If PART THIRD should not be at hand the moment it is wanted, still, the sacrifice of time, in waiting till it may be obtained, will be less than the sacrifice of progress that would result from changing systems.

K E Y

TO THE

NORTH AMERICAN ARITHMETIC.

PART THIRD.

ARTICLE II.

<i>Example</i>	478 241 100
2.	7 692 089
3.	19 020 005
4.	800 000 000 000
5.	1 000 644 513
6.	1 534 003 018 004
7.	200 000 016 001
8.	11 001 000 060
9.	5 008 004 009 007
10.	100 020 300 002 004
11.	31 000 000 000 560
12.	6 214 000 000 000 000
13.	249 000 000 000 075 022
14.	46 001 000 019 000 000 708
15.	900 000 000 325 000 000 002 014

ARTICLE III.

1. 132 164	3. 75879	4. 6 144 030 579
2. 140 819		

ARTICLE IV.

1. 822	3. 440 565	5. 99 999 967 501
2. 287 974	4. 482 668	

ARTICLE V.

1. 4 426 491 540	4. 249 755 176	6. 936 187 200
2. 23 183 864 291	5. 2 331 200 000	7. 105 000 000 000
3. 2 510 084 850		

ARTICLE VI.

1. 451 433 367 $\frac{8}{9}$	4. 952 649 $\frac{19221}{27856}$	7. 4611 $\frac{23}{63}$
2. 147 929 $\frac{352}{503}$	5. 191 863 $\frac{51842}{86008}$	8. 26 995 790 $\frac{3337}{1274}$
3. 6021 $\frac{719}{8649}$	6. 806 574 $\frac{3924}{10000}$	

ARTICLE VII.

The only answers to be given by the learner in this article, consist in examples of the terms defined, and properties described. Since these examples may be various, none are here introduced — they are left to the criticism of the teacher

ARTICLE VIII.

1. 28884	11. 25203	21. 11 feet.
2. 15500 papers.	12. 365 soldiers.	22. 8 rods.
3. 3473	13. 78 053 034 201	23. 900
4. 7 000 000 s.m.	14. 416 784lb.	24. 240.
5. 94038	15. 14	25. 12600
6. 558 members.	16. 18 days.	26. 2940
7. 470 624	17. 18	27. 1 216 299 276
8. S. 48; H. 240	18. 17	28. 2016 gallons.
9 4629	19. 6	29. 720 barrels.
10. \$2800	20. 7	

ARTICLE IX.

1. 337 585qr.	4. 35T. 17cwt.	5. 1 332 005gr.
2. £25 14s. 1d.	1qr. 23lb. 7oz.	6. 17E. e. 3qr
3. 240 157gr.	12dr	7. 460pt.

8 19hhd	31. 1Y. 274d. 19h.	54. 1002 $\frac{2}{3}$ bl. =
9. 36lpt.	5m.	1002 $\frac{3}{10}$ bl.
10. 82m. 4fur. 34r.	32. £15550 4s	55. \$5.736 $\frac{2}{3}$
11. 307 200 sq. r.	33. 137lb. 0oz.	56. 97 $\frac{21}{40}$ cts.
12. 27 cubic yd.	15dwt. 8gr.	57. 58 $\frac{1}{8}$ times
13. 32197728sec.	34 15T. 2cwt. 1qr.	58. \$199.69
14. £290 4s. 0d.	2lb.	59. \$1.89
1qr.	35. 2993bu. 0pk.	60. \$62.72
15. 10lb 10oz.	6qt. 1pt.	61. \$108
10dwt. 23gr.	36. 145T. 0p.	62. 672 bottles.
16. 41T. 14cwt. 1qr.	45gal.	63. £13 16s.
21lb. 6oz.	37. 188m. 0fur. 5r.	64. 2d. 1qr.
17. 117yd. 3qr.	38. 67m. 324A.	65. \$32.76
2na.	2R. 15r.	66. 6 cords.
18. 399bu. 3pk.	39. 257Y. 333d.	67. £4 16s. 6d.
5qt. 1pt.	40. £5 9s. 5d.	68. \$1494
19. 41p. 8l gal.	2 $\frac{1}{3}$ qr.	69. 64 cubic in.
1qt.	41. 1lb. 2oz. 2dwt.	70. 8 cubic m.
20. 172A. 0R. 15r.	2 $\frac{3}{13}$ gr.	27 cubic in.
21. 660T. 41ft.	42. 2T. 8cwt. 0qr.	64 cubic in.
879in.	5lb. 9oz. 6 $\frac{3}{4}$ dr.	125 cubic in.
22. 1lb. 1oz. 4dwt.	43. 4E. e. 2qr.	71. 1664 cubic in
23. 5T. 15cwt. 1qr.	0 $\frac{7}{11}$ na.	72. 13760 cu. in.
13lb.	44. 32bu. 1pk. 5qt.	73. £588 14s. 6d.
24. 1lb 11 $\frac{1}{3}$ 13 09	1 $\frac{1}{3}$ pt.	74. 45gal. 0qt. 1pt.
15gr.	45. 14gal.	75. 16m. 2fur. 9r.
25 4yd. 2qt 2ra.	46. 3d. 15h. 50m.	76. 15 cords.
26. 41bu. 2pk. 1qt.	24s.	77. \$1044.16
1pt.	47. \$94644.55	78. 3lb. 7oz. 6dwt
27 2hhd. 46gal.	48. \$7336.37	16gr.
2qt.	49. \$99702.82	79. 529yd. 2qr.
28. 6bl. 0kil. 0fir.	50. \$7387	2na.
2gal. 1qt.	51. \$41.28	80. 76bl. 0kil. 1fir
29. 2yd. 1ft. 4in.	52. \$117.36	1gal. 1qt.
30. 582A. 1R. 9r.	53. 4 $\frac{1}{10}$ times	81. 31 $\frac{1}{2}$ gal. = 1bl.

82. £519 19s 8d.	84. 80A. 1R. 30r.	87. 48 feet.
21 ⁹ qr.	85. 32 rods.	88. 10ft. 8in.
83. 1 tier. 21gal.	86. 131 feet.	89. 10 feet.

ARTICLE X.

1. $\frac{1}{2}$	26. $\frac{6^{\frac{1}{2}}}{12^{\frac{1}{2}}}$	51. 5d. 20h. 52m
2. $\frac{17}{37}$		154 $\frac{1}{2}$ s.
3. $\frac{1}{13} \frac{15}{17} \frac{1}{2} \frac{13}{28}$	27. $\frac{3805}{5760} = \frac{761}{1152}$ lb.	52. 2qr. 17lb. 1oz
$\frac{90}{217} \frac{7}{8}$	28. $\frac{77}{320}$	31 $\frac{1}{2}$ dr.
4. $\frac{14}{14}$	29. $\frac{7}{2}$ yd.	53. Performed.
5. $\frac{275}{13}$	30. $\frac{373}{2520}$ hhd.	54. $\frac{53}{266}$
6. $\frac{1026}{342}$	31. $\frac{9092}{35840} = \frac{2273}{8960}$ T	55. $\frac{13}{374}$
7. $\frac{1110}{115}$	32. 3qt. 1pt. 1 $\frac{1}{2}$ gi.	56. $\frac{324}{60}$
8. $\frac{\$ 5176}{8}$	33. 13s. 4d.	57. $\frac{3632}{160}$
9. $\frac{256}{7}$	34. 1ft. 9 $\frac{1}{2}$ in.	58. $\frac{5232}{240}$
10. $\frac{613}{24}$	35. 1qr. 21lb.	59. $\frac{5}{12}$
11. $\frac{143213}{234}$	36. 3pk. 6qt. 0 $\frac{1}{2}$ pt.	60. $\frac{332}{25474}$
12. $\frac{\$ 8665}{16}$	37. $\frac{525}{840}, \frac{770}{840}, \frac{540}{840}$	61. $\frac{431}{60}$
13. $45\frac{1}{2}$	$\frac{728}{840}$	62. Performed.
14. $177\frac{3}{8}$	38. $\frac{225}{1275}, \frac{170}{1275}$	63. $30\frac{5}{8}$
15. 3021	$\frac{204}{1275}$	64. $\frac{70}{30}$
16. $\$ 137\frac{3}{4}$	39. $\frac{153}{408}, \frac{240}{408}, \frac{204}{408}$	65. $\frac{2227}{50}$
17. $\frac{8}{8}$	$\frac{340}{408}$	66. $8\frac{1}{13}$
18. $\frac{5}{33}$	40. $\frac{702}{14586}, \frac{3553}{14586}$	67. $2772\frac{3}{10}$
19. $\frac{19}{200}$	41. $\frac{140}{315}, \frac{108}{315}$	68. $\frac{5}{18}$
20. $\frac{27}{1256}$	42. $\frac{63}{23}$	69. $104\frac{43}{160}$
21. $\frac{4}{4}$	43. $\frac{32}{7}, \frac{2}{25}, \frac{47}{64}, \frac{32}{68}$	70. They are alike
22. $\frac{11\frac{1}{2}}{14} = \frac{11\frac{1}{2}}{14}$	$\frac{35}{8}, \frac{22}{25}, \frac{182}{136}$	71. $7373\frac{3}{14}$
23. $\frac{4\frac{1}{2}}{5}$	44. Performed.	72. $12474\frac{1}{2}$
24. $\frac{6\frac{1}{2}}{24} = \frac{6\frac{1}{2}}{24}$	45. $44\frac{47}{280}$	73. $173\frac{13}{24}$ sq. in.
25. $\frac{3\frac{1}{2}}{4}$	46. $\frac{2671}{840}$	74. Performed.
	47. $\frac{22323}{720}$	75. 30
	48. $\frac{443161}{3960}$	76. $\frac{15}{6}$
	49. 10 $\frac{1}{8}$ pence.	77. $\frac{3}{40}$
	50. 1pt. 1 $\frac{83}{1648}$ gl.	78. $561\frac{1}{2}$

79. $\frac{1}{104}$	101. 25r. 3yd. 0ft.	124. £258 7s. 7d
80. $97\frac{7}{8}$	104in.	$1\frac{1}{2}$ qr.
81. $21\frac{1}{2}$	102. $2715\frac{1}{3}$ lb.	125. 1s. 3d. $0\frac{22}{100}$ qr
82. $5\frac{6}{100}$	103. 59yd. 5ft.	126. £5 18s. 0d
83. $6\frac{7}{8}$	1080in. cubic.	$31\frac{1}{2}$ qr.
84. $22\frac{435}{1256}$	104. 49ft. 378in.	127. \$5.25
85. $1124\frac{2}{21}$ times.	cubic.	128. \$2.75 $\frac{1}{4}$
86. $5\frac{5}{693}$ times.	105. 69ft. $21\frac{9}{10}$ in.	129. $15\frac{11}{100}$ cents.
87. $37\frac{1}{35}$ times.	106. $8\frac{1}{2}\frac{3}{4}$ feet.	130. $88\frac{11}{100}$ cents.
88. $3628\frac{1}{2}$ times.	107. 2hhd. 45gal.	131. \$76.32 $\frac{1}{8}$
89. $571\frac{1}{3}$ times.	3qt. Opt.	132. \$14.40 $\frac{1}{4}$
90. 230m. 2fur. 30r.	$2\frac{866}{1783}$ gl.	133. \$82.22 $\frac{17}{100}$
91. $28604\frac{28}{103}$ ti.	108. \$304.21 $\frac{7}{8}$	134. \$963.57 $\frac{1}{4}$
92. 10cwt. 1qr.	109. \$49.38 $\frac{8}{9}$	135. 5833 $\frac{1}{10}$ lb.
20lb. 8oz.	110. 504 bottles.	136. \$5166.69 $\frac{1}{4}$
93. 5T. 3cwt. 2qr.	111. $1154\frac{1}{2}$ bottles.	due to D.
24lb. 11oz.	112. \$1083	137. $18\frac{77224862}{403964944}$
$13\frac{7}{15}$ dr.	113. $721\frac{1}{2}$ cents.	138. $\frac{13}{100}$
94. 86A. 0R. 1r.	114. $422\frac{2}{3}$ cents.	139. $972\frac{2}{3}$
10yd. 108in.	115. \$51.01 $\frac{1}{2}$	140. $472\frac{2}{3}$
95. \$1734.91 $\frac{1}{14}$	116. \$4.98 $\frac{3}{4}$	141. $\frac{7}{10}$
96. \$71.68 $\frac{1}{4}$	117. \$5.04 $\frac{1}{4}$	142. $\frac{33}{380}$
97. \$3.93 $\frac{1}{4}$	118. \$185.41 $\frac{2}{3}$	143. $\frac{78}{899}$
98. 1m. 145A. 1R.	119. \$75.33	144. $\frac{487}{900}$ and $\frac{227}{900}$
30r. 7yd. 5ft.	120. \$5.14 $\frac{5}{8}$	145. $\frac{31}{36}$
9in.	121. £20 15s. 0d.	146. $7\frac{7}{12}$
99. 19A. 1R. 6r.	$3\frac{3}{4}$ qr.	147. $\frac{75}{308}$
20yd. 7ft.	122. 2s. 9d.	148. $7\frac{41}{100}$
$24\frac{1}{2}$ in.	$01\frac{874}{1371}$ qr.	149. $\frac{27}{112}$ of ship
100. 2C. 4ft. w. 15c.	123. 8d. $01\frac{1}{2}$ qr.	150. $\frac{19}{240}$ of ship
ft. 1620c. in.		151. $\frac{35}{486}$ of ship

ARTICLE XI.

1. Ninety-nine hundredths.

Sixty-four thousandths.

D *

Three ten-thousandths

Five thousand, two hundred and thirty-seven *ten-thousandths*.

Two thousand and eight *ten-thousandths*.

Six *hundred-thousandths*.

Three thousand, seven hundred and ninety-five *hundred thousandths*.

One hundred, and thirty thousand, and nine *millionths*.

Four, and eight *thousandths*.

Six, and thirty-seven thousand and two *hundred-thousandths*.

Ninety-nine thousand, nine hundred and ninety-nine *hundred-thousandths*.

Five, and one *ten-thousandth*.

Twenty-four, and nine *hundredths*.

Six hundred and thirty, and one thousand one hundred and seventy-four *ten-thousandths*.

Six, and nine hundred and seventy-two thousand four hundred and seventy-nine *millionths*.

Twenty-eight, and seven hundred and ninety-seven *thousandths*.

2. 18.7; 24.09; 38.006; 65.0008; 2.025; 326.13;
7.021; 19.0342; 33.17; 8.0201; 97.042; 6.1251;
8.0011; 47.00001; 6.0251; 55.0000291

3. Performed.	15. .0065	27. \$149.8893
4. 9386.9465	16. \$7.589	28. \$2.475
5. 100.59139	17. \$14.094	29. \$1365.392
6. \$380.62	18. Performed.	30. \$124673.17875
7. \$176.1964	19. 115.56.	31. \$91.92
8. Performed.	20. 25.1494	32. \$14.3034
9. 24.59169	21. 14.3681	33. \$6.55875
10. 212.24	22. .00396	34. .00182002625
11. 12689.30725	23. .0073111	35. 36298.1
12. 50.718964	24. 5749.6789656	36. Performed.
13. .9	25. \$417.496	37. Performed.
14. 11.367	26. \$210.42	38. Performed

39. Performed.	.008	95. \$2439.45875
40. 135.070127+	61. .14	96. \$110.2734375
41. .036912+	62. .075	97. \$4.275
42. 705.936961+	63. 247.3125	98. \$2.135249+
43. 1196.172248+	64. Performed.	99. \$15.247351+
44. 198.377168+	65. Performed.	100. Performed.
45. 1148.997696+	66. $\frac{3}{8}$	101. 15s. 6d.
46. 2325.203252+	67. $\frac{38241}{50000}$	102. 7d. 2qr.
47. 20.163	68. $\frac{102101}{200000}$	103. 5oz. 12dwt
48. .00020133+	69. $\frac{542022}{5000000}$	15.744gr.
49. 56.25	70. $\frac{36001}{781250}$	104. 2qr. 13lb.
50. \$5.781764+	71. £.628125	14oz. 3.328d
51. \$36.715	72. .625cwt.	105. 20r. 4yd. 2ft.
52. 1.5 barrel.	73. .3375 acre.	9.408in.
53. \$5.384	74. .0569444+lb.	106. 1R. 22r.
54. 88.38095238+	75. .265625bu.	107. 21lb. 15oz.
55. .033834	76. .125tun.	3.712dr.
56. .125	77. .0023674+m.	108. 13.1229gal.
57. .639175+	78. .00103305+A.	109. 1qr. 24lb. 4oz.
58. .5	79. .109375 cord.	13.824dr.
.75.	80. .0024917+Y.	110. £741 13s.
.833333+	81. £19.6895833	8d. 3.52qr.
.1875	82. 17.156746+hhd.	111. 84M. 5fur.
.153846+	83. 15.0128906+T.	25r. 1yd. 1ft
.230769+	84. 4.9049242+m.	7.44in.
.933333+	85. 25.6567442+	112. 50A. 2R. 38r
.555555+	sq. rods.	21yd. 7ft. 2.88in
.011686+	86. \$566.533125	113. \$0.166+
59. Performed.	87. \$391.12125	\$0.333+
60 .5	88. \$73.353	\$0.50
.75	89. \$40.19225	\$0.666+
.2	90. \$53.035713+	\$0.833+
.875.	91. \$621.751745+	114. \$0.125
.6875	92. \$0.7265625	\$0.25
.791666+	93. \$18.3425	\$0.375
06	94. \$499.06875	\$0.50

	\$0.625	132. \$3.45614+	165. 8.666666+
	\$0.75	133. \$217.0625+	bushels.
	\$0.875	134. \$4.99506+	166. 38.823529+
115.	\$0.133+	135. \$127.365712+	bushels.
	\$0.266+	136. \$614.678089+	167. 43.636363+
	\$0.40	137. \$21.82375	gallons.
	\$0.533+	138. \$1.715	168. \$12.94444+
	\$0.666+	139. \$9.05625	169. \$231.65
	\$0.80	140. \$6.513888+	170. 265.4775 sq.
116.	\$0.214+	141. \$0.0559+	feet.
	\$0.428+	142. \$11.71875	171. 15.048599+
	\$0.642+	143. \$13.27	sq. feet.
	\$0.857+	144. \$96.875	172. 39.1874917+
117.	\$0.20	145. 4.899133+m.	cubic feet.
	\$0.40	146. 142.7825	173. 10.382666+
	\$0.60	147. 142.7825	feet.
	\$0.80	148. .4275	174. 615.125 sq.ft.
	\$1	149. 1.539	175. \$130.40
118.	\$2.25	150. 35.7	176. \$313.313
119.	\$143.229+	151. 1119.552	177. \$1.50
120.	\$1.687+	152. 2.871481	178. \$930.699
121.	\$64.716+	153. 52.33275	179. \$1724.6173
122.	\$2.522+	154. \$2234.46	180. A receives
123.	\$38.338+	155. \$2234.46	\$40.9475,
124.	\$3.607+	156. \$5519.68	B receives
125.	\$234.20+	157. \$21.52	\$14.3925,
126.	\$3.483+	158. \$78.678	C relinquishes
127.	\$85.862+	159. \$62.50	\$32.4825,
128.	\$1.50	160. \$13145.10	D relinquishes
	\$1.125	161. 54.014598	\$22.8575.
	\$1.20	gallons.	181. 134.848484+
	\$1.928+	162. 54.545454+	rods.
	\$1.80	pounds.	182. 56m. 42s.
129.	29.017037T.	163. 30.826369+	183. .1964
130.	1.85149hhd.	hours.	184. \$1.50b
131.	\$91.074	164. 21.12 acres.	185. 79.92
			186. 3.0515 A.

187 7427.03	Horse cost	196 16.0681b.
188. \$4.6675	\$185.085	197. 5.148681 +
189. 145.4995	191. 572.487	198. 6.458802 + ft.
greater;	192. 15.142857 +	199. 3.346405 + ft.
144.5095	feet.	200. 17.048907 +
smaller.	193. 5.235988	feet.
190. Chaise cost	194. 1260 soldiers.	201. 20.408163 +
\$252.165	195. .001125	feet.

ARTICLE XII.

1. $\frac{2}{3}$	11. $\frac{83}{900}$.05050505
2. $\frac{1}{27}$	12. $\frac{56647}{6666600}$.09029029
3. $\frac{41}{333}$	13. Performed.	.66666666
4. $\frac{1}{7}$	14. 9.81481481	16. .531531531
5. $\frac{28420}{37037}$	1.50000000	.734848484
6. $\frac{2124}{333}$	87.26666666	.070707070
7. $\frac{2}{15}$.08333333	.053053053
8. $\frac{67}{450}$	124.09090909	.749000000
9. $\frac{527}{990}$	15. .32132132	17. Performed
10. $\frac{49593}{49950}$.82626262	
18. Infinite. The repetend	23. Performed.	
has 2 figures; beginning	24. 5977.10367	
at the first place.	25. 222.58239056	
19. Infinite. The repetend	26. 339.62651077	
has 6 figures; beginning	27. Performed.	
at the first place.	28. 391.5526	
20. Infinite. The repetend	29. 3.8182	
has 4 figures; beginning	30. 1407.69272404717949	
at the third place.	31. Performed.	
21. Infinite. The repetend	32. 7.262	
has 44 figures; beginning	33. 750730.518	
at the sixth place.	34. 31.791	
22. The decimal is finite.	35. 34998.4199003	

36. 13.5169533

37. 275

38. .249158

39. Performed

40. 301.714285

41. 3.145

42. .041763253253397282174260591526778577138289368505195843

ARTICLE XIII.

1. $\frac{2}{7}$ 2. $\frac{1}{5}$ 3. $\frac{10}{17} \frac{21}{34}$ 4. $\frac{49}{34}$ 5. $\frac{3}{2} \frac{37}{24}$ 6. $\frac{7}{9}$ 7. $\frac{5}{6}$ 8. $\frac{101}{444}$ 9. $\frac{12}{66}$ 10. $\frac{9}{56}$ 11. $\frac{32}{40}$

12. Performed.

13. $\frac{85}{105}$ 14. $\frac{200}{487}$ 15. $\frac{375}{602}$ 16. $\frac{204}{325}$

17. Performed

18. $\frac{742}{200}$ 19. $\frac{3}{2}$ 20. $\frac{32}{5}$ 21. $\frac{1571}{290}$ 22. $\frac{970}{253}$ 23. $\frac{1}{2}$ 24. $\frac{97}{108}$ 25. $\frac{7}{11}$ 26. $\frac{28}{43}$ 27. $\frac{47}{50}$ 28. $\frac{187}{223}$ 29. $\frac{87}{224}$ 30. $\frac{283}{4192}$ 31. $\frac{67}{1920}$ 32. $\frac{1256}{2079}$ 33. $\frac{4}{1}$ 34. $\frac{1}{2}$ 35. $\frac{26}{27}$ 36. $\frac{108}{65}$ 37. $\frac{279}{88}$ 38. $\frac{67}{36}$ 39. $\frac{3695}{1224}$ 40. $\frac{13579}{8442}$ 41. $\frac{7173}{4352}$

42. Performed.

43. 299 miles.

44. 2min. 30sec.

45. \$70.357 $\frac{1}{2}$

46. \$129016.84

47. 118 $\frac{47}{57}$ barrels.48. 1 $\frac{1}{2}$ hours.49. \$99.555 $\frac{5}{8}$ 50. 4523 $\frac{1}{13}$ yards.

51. 75 bushels.

52. 293 $\frac{1}{3}$ feet.53. 262 $\frac{3}{2}$ yards.54. \$229.894 $\frac{1}{19}$

55. £209 10s.

56. 11A. 2R.

172 $\frac{3}{8}$ r.57. \$896.666 $\frac{2}{3}$ 58. \$69.758 $\frac{4}{5}$ 59. \$57.24 $\frac{9}{109}$ 60. 32 $\frac{508}{3447}$ bl.61. 54 $\frac{22}{3}$ bottles.

62. 77 gross.

63. £1030 7s. 4d.

2qr.

64. 72 $\frac{52}{63}$ yards.65. 60 $\frac{21}{376}$ days.66. \$183.157 $\frac{17}{8}$ 67. \$289.718 $\frac{1}{4}$ 68. \$0.528 $\frac{6}{23}$

69. 114.77m.

70. \$22.645 $\frac{1285}{2182}$

71. 90.45 miles.

72. \$3.50

73. 233 $\frac{1}{2}$ miles.74. \$0.715 $\frac{5}{8}$

75. Performed.

76. \$2857.142 $\frac{6}{7}$

77. \$630

78. 715 $\frac{5}{8}$ rods.79. \$190.515 $\frac{4}{7}$ 80. \$691.33 $\frac{2}{31}$ 81. 49 $\frac{119}{130}$ days.82. 1h. 55 $\frac{82}{293}$ m83. 6 $\frac{823}{5184}$ hours84. 37 $\frac{1}{2}$ days.

85. $132\frac{37}{60}$ days.	109. 96 men.	132. Performed.
86. Performed.	110. Performed.	133. \$2.266 $\frac{2}{3}$
87. $26\frac{11}{48}$ days.	111. $73\frac{9}{11}$ days.	134. \$33.185 $\frac{5}{27}$
88. $323\frac{7}{19}$ days.	112. 18 years.	135. \$4.96 $\frac{32}{33}$
89. $5\frac{2}{3}$ yards.	113. 209 acres.	136. \$394.312 $\frac{1}{2}$
90. $146\frac{2}{3}$ yards.	114. \$1120	137. 500 men.
91. $31\frac{1}{2}$ days.	115. $31\frac{2}{3}$ inches.	138. $41\frac{2}{3}$ ounces.
92. 372 days.	116. 7 men.	139. 585 yards.
93. $22\frac{22}{119}$ days.	117. £305 Os.	140. 1791 $\frac{2}{3}$ bl.
94. $5989\frac{1}{2}$ times.	8 $\frac{8}{9}$	141. 432 tiles.
95. $38\frac{1}{13}$ days.	118. $2891\frac{1}{5}$ bottles.	142. \$125.917 $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{3}$
96. $9\frac{87}{148}$ days.	119. 725 bottles.	143. 1st., $\frac{4}{5}$ of bl.
97. $20\frac{535}{2352}$ days.	120. Performed.	2d., $\frac{4}{5}$ of bl.
98. Performed.	121. $92\frac{4}{7}$ days.	144. \$13.46 $\frac{41}{704}$
99. \$99.	122. 162 men.	145. $13\frac{1}{2}$ months
100. 12 pounds.	123. \$263.863 $\frac{7}{11}$	146. \$16.25
101. 2520 exam.	124. $434\frac{1}{29}$ bu.	147. Wife, \$2400
102. \$1.105	125. 30 pounds.	Son, \$2000
103. \$17.67	126. Performed.	Dau. \$1500
104. $511\frac{1}{2}$ miles.	127. 5256	Serv. \$100
105. $12\frac{1}{2}$ days.	128. \$32630.541 $\frac{1}{2}$ $\frac{1}{7}$ $\frac{1}{7}$	148. £3 11s. 3d.
106. 15 cows.	129. \$11221.333 $\frac{1}{3}$	1 $\frac{1}{11}$ qr.
107. $9\frac{3}{4}$ men.	130. $11221\frac{1}{3}$	149. 8h.0m.30 $\frac{3}{4}$ ¢
108. $35\frac{80}{117}$ men.	131. 3552 acres.	

ARTICLE XIV.

1. Performed.	11. \$2.08	Cot. \$364.20
2. \$28.39	12. \$31.86	19. Performed.
3. \$1	13. \$224.40	20. \$123.57
4. \$8.34	14. \$2.08	21. \$2.952
5. \$3	15. \$78.07	22. \$44.75
6. \$1.26	16. \$99	23. 50 cents.
7. \$6.00	17. \$48	24. \$0.305
8. \$5.94	18 Bro. \$291.36	25. \$18.974
9. \$7.00	Lin. \$461.32	26. \$33.048
10. \$70	Cal. \$97.12	27. 230 barrels.

28. Lost 17.6lb.	48. $36\frac{1}{2}$ pr. ct.	3qr.+
\$101.712	49. 6 pr. ct., or .06	67. \$131.62
29. \$4.20	50. $34\frac{2}{7}$ pr. ct.	68. \$13.85125
30. Performed.	51. $41\frac{26}{181}$ pr. ct.	69. \$6738.03
31. \$27.04	52. $\frac{800}{1427}$ of 1 pr. ct.	70. \$227.73 com.
32. \$2.533 $\frac{1}{3}$	53. $\frac{70}{101}$ of 1 pr. ct.	\$8881.47 to pay
33. \$75.075	54. $2\frac{378}{4811}$ pr. ct.	71. \$1050
34. \$1.558 $\frac{1}{3}$	55. $54\frac{3}{5}$ pr. ct.	72. \$755.625
35. \$13.30	56. Performed.	73. \$3888
36. \$0.633 $\frac{1}{3}$	57. £3 16s. 8d.+	74. \$9652.50
37. Performed.	58. 5s. 9d. 3qr.+	75. \$1775.25
38. \$89.8716	59. £3 12s. 11d.	76. \$4050
39. \$1.56492	2qr.+	77. \$5818.50
40. \$17.085	60. 4s. 11d.+	78. \$2194.03125
41. \$3.1017	61. £155 0s. 9d.	79. \$1668.42
42. \$272	2qr.+	80. \$485.40
43. \$0.48815	62. 9s. 5d. 1qr.	81. \$12.975
44. \$0.01275	63. £9 13s. 3d.	82. \$36.625
45. Performed.	2qr.+	83. \$12.98888+
46. 13 $\frac{1}{3}$ per cent.	64. £12 10s.	84. \$540
47. Pd. $46\frac{38}{47}$ pr. ct.	65. £7 7s. 7 $\frac{1}{2}$ d.	85. \$113.75
Due $53\frac{9}{47}$ pr. ct.	66. £22 9s. 1d.	86. \$42.4905

ARTICLE XV.

1 1 month, .005	5d., .00083+	5. Performed.*
6 months, .03	6d., .001	6. \$26.805+
7 months, .035	7d., .00116+	7. \$17.13
8 months, .04	9d., .0015	8. \$22.44
9 months, .045	24d., .004	9. \$63.905+
2 1Y. & 1m. .065	26d., .00433+	10. \$834.596+
1Y. & 3m. .075	4. 2m. and 12d.,	11. \$1307.082+
1Y & 4m. .08	.012	12. \$11.90
1Y. & 10m. .11	3m. and 10d.,	13. \$41.193+
3. 1d., .00016+	.01666+	14. \$20.747+
2d., .00033+	5m. & 18d., .028	15. \$2.177+
3d., .0005	10m. & 29d.,	16. \$18.783+
4d., .00066+	.05483+	17. \$736.213+

* No more than five decimal places are embraced in any of the operations for computing interest.

18. \$211.433+	58. \$0.285	98. £9 16s. 10½d
19. \$34.066+	59. \$217.578+	99. £152 2s
20. \$13.646+	60. \$0.485+	10½d.+
21. \$158.518+	61. \$5.555	100. £538 4s.
22. \$228.07+	62. \$37.68+	2½d.+
23. \$20.738+	63. \$0.872+	101. £7 5s. 6½d.+
24. \$23.196+	64. \$12.327	102. £7 0s. 0½d.+
25. \$46.594+	65. \$5257.45	103. £31 7s.
26. \$11.107+	66. \$0.833+	7½d.+
27. \$111.993+	67. Performed.	104. £229 13s.
28. \$28.023+	68. Performed.	7½d.+
29. \$69.932+	69. \$46.483+	105. £54 16s.
30. \$5.585+	70. \$708.66	4½d.+
31. \$85.848+	71. \$17.57	106. £121 1s.
32. \$88.068+	72. \$310.08	6½d.+
33. \$12.845+	73. \$45.871	107. £87 7s. 9½d
34. \$15.953+	74. \$22.241+	108. £35 0s.
35. \$4.677+	75. \$1135.163	7½d.+
36. \$13.744+	76. \$495.	109. £15 0s.
37. \$28.011+	77. \$1529.15	5d.+
38. \$49.900+	78. \$281.627+	110. Performed.
39. \$1908.954+	79. \$1141.273+	111. \$160.635+
40. \$12.711+	80. \$55.934+	112. \$15.615+
41. \$52.508+	81. \$21.754+	113. \$131.735+
42. \$84.63	82. \$30.206+	114. \$10.896+
43. \$45.642+	83. \$111.775+	115. \$41.23
44. \$44.645+	84. \$5219.49+	116. Performed.
45. \$53.291+	85. \$91.60	117. \$50.80+
46. \$68.75	86. \$15.942	118. \$143.794+
47. \$0.637+	87. \$225.50+	119. \$36.561+
48. \$6.96	88. \$165.55	120. \$11.727+
49. \$6.39	89. \$112.43+	121. \$252.207+
50. \$64.982+	90. \$93.20+	122. \$214.793+
51. \$4369.770+	91. \$44.616+	123. \$375.12
52. \$0.286+	92. \$58.417+	124. \$145.479+
53. \$108.45	93. \$1162.273+	125. \$79.167+
54. \$1.36	94. \$226.608+	126. Performed.
55. \$4.833+	95. \$14.895+	127. \$309.704+
56. \$99.175+	96. Performed.	128. \$155.398+
57. \$0.75	97. £3 9s. 9½d.+	129. \$574.326+

130 £129 3s. 6d. 2qr. +	135. 6 per cent.	140. .6, or $\frac{2}{3}$ of a Y
131. \$337.652 +	136. 6 per cent.	141. 1.6, or $1\frac{1}{2}$ Y
132. \$656.065 +	137. .6, or $\frac{2}{3}$ of a Y.	142. 16.6, or $16\frac{2}{3}$ Y
133. $18\frac{25}{31}$ pr. ct.	138. 5 years.	
134. 6 per cent.	139. 1.3, or $1\frac{1}{2}$ Y.	

ARTICLE XVI.

\$436.893 +	5. \$2465.866 +	9. \$105.523 +
2. \$497.674 +	6. \$11.681 +	10. \$7.178 +
3. \$1403.669 +	7. \$6397.931 +	11. \$6.185 +
4. \$1420.565 +	8. \$6.472 +	12. \$735.763 +

ARTICLE XVII.

1. \$4.262 +	4. \$435.954	7. \$2.2515
2. \$13.95	5. \$2963.52	See page 72.
3. \$2501.735 +	6. \$450.531	8. \$163.054

ARTICLE XVIII.

1. 6 months.	5. 8 months.	9. $108\frac{1}{2}$ days.
2. 7m. 3d.	6. 4m. 10d.	10. 10 months.
3. 7m. $28\frac{2}{15}$ d.	7. $7\frac{1}{12}$ months.	11. 10 months
4. 8 months.	8. 6 months.	

ARTICLE XIX.

1. Profit, \$35 $31\frac{1}{2}$ per cent.	5. $11\frac{25}{1000}$ pr. ct.	9. Lose $12\frac{1}{2}$ pr. ct.
2. \$6.30 per yd.	6. 90 cents.	10. $3\frac{1}{2}$ cts. per lb.
3. Lost 15 pr. ct.	7. \$3.773 +	11. 18 cts. per lb.
4. \$5.625 per bl.	8. Lose 1 pr. ct.	12. 30bu. at \$1.25

ARTICLE XX

1. Performed.	L's sh. \$875	P's sh. \$300
2. W's sh. \$625	3. H's " \$800	C's " \$150
S's " \$500	V's " \$500	4. A lost \$160

B lost \$100	B's, \$119.10	15. A, \$11 25
C lost \$60	C's, \$70.10	B, \$20.00
D lost \$30	10. A's, \$180	C, \$29.25
5. Er. son, \$300	B's, \$90	16. A pays \$6.40
Yr. son, \$250	C's, \$50	B " \$6.40
Daugh., \$200	11. X's, \$450	C " \$5.20
6. A had \$2280	Y's, \$247	D " \$2.00
B had \$1584	Z's, \$121.50	17. Howard's,
C had \$2536	12. R, \$401.70	\$1167.924+
7. A's gain, \$162	S, \$370.50	Bender's,
B's stock, \$750	13. A's, \$228	\$905.141+
8. F. \$6187.60	B's, \$108	Dorr's,
T. \$4640.70	C's, \$100	\$817.547+
H. \$1546.90	14. G's, \$352.50	Tremere's,
9. A's, \$154.20	D's, \$330.00	\$717.786+

ARTICLE XXI.

1. A, \$96.544	C will receive	55½ per cent.
B, \$120.60	\$1399.897+	A receives
C, \$248.256	3. A, \$404.25	\$451.625+
D, \$166.60	B, \$567.60	B, \$2038.77+
2. A will receive	C, \$640.62	C, \$1021.422
\$1052.203+	D, \$900	D, \$65.379
B will receive	4. Bankrupt pays	E, \$452.103
\$909.638+		

ARTICLE XXII.

1. Performed.	C, \$17.07	Woman, \$9.30
2. A paid \$36.80	D, \$68.42	3. \$131.565
B, \$19.60	E, \$8.75	4. \$374.87

ARTICLE XXIII.

1. Performed.

2. The general average was .013286 per cent. of the whole contributory interest. The vessel paid \$47.83; the freight, \$1.02; cargo, viz. E. Foster, \$7.97; Greason and Haughton, \$3.19; Gold and Tucker, \$2.79; Bucknam and Gunnison, \$5.31; Samuel Wheeler, \$2.13. Buck and Hammond, \$2.94.

3. The general average or loss per cent. is .0217014+; the ship contributes \$238.715+; the freight, \$12.478+; Bndge and More, \$393.555+; How and Mears, \$368.924+; Gray and Bellows, \$318.577+; Russell, \$79.644+; Howard, \$20.074+.

ARTICLE XXIV.

1. Performed.	7. 6cwt. 2qr. 14lb.	13. \$113.225
2. 24cwt. 1qr. 4lb.	8. 39cwt. 3qr.	14. \$4440
3. 4cwt. 0qr. 8lb.	9. \$483.60	15. \$37.05
4. 12cwt. 1qr. 20lb.	10. \$2520.76	16. \$57.60
5. 5cwt. 3qr. 12lb.	11. \$23.96	17. \$27.50
6. 8cwt. 3qr. 8lb.	12. \$136.05	18. \$13.767+

ARTICLE XXV.

1. Performed.	24. \$1266.666+	44. 170 yards.
2. \$21.	25. \$27-	45. 450 men
3. 496 yards.	26. $40\frac{615}{352}$ days.	46. 44 days.
4. \$401.50	27. 453 1yd. 1qr. 2 $\frac{1}{2}$ na.	47. 900 tiles.
5. 28 workmen.	28. 150 men.	48. 30 pounds.
6. 21 bushels.	29. \$954.062+	49. 96 pounds.
7. \$2.25	30. \$1787.073+	50. 80 days.
8. 113 $\frac{1}{2}$ feet.	31. 22 $\frac{2}{3}$ hours.	51. 11 men.
9. 72 yards.	32. 13 yards.	52. 24 ounces.
10. 8 days.	33. 217ft. 9in.	53. 4 more men.
11. \$78.75	34. A, \$20.109+	54. 480 $\frac{60035}{225018}$ m.
12. \$6.48	B, \$29.39+	55. 384 barrels.
13. 50 yards.	35. 40 yards in br.	56. 337 $\frac{1}{2}$ pears.
14. 56 pounds.	36. 102 $\frac{54}{3}$ barrels.	57. 288 $\frac{59}{207}$ days
15. \$20	37. \$326.70	58. \$80.55
16. \$1794.375	38. \$5845.873+	59. \$1.60
17. \$1712.746+	39. 9m. 7fur. 24r.	60. 27 acres.
18. \$0.75	4d. 1ft. 3in.	61. 15 pounds.
19. 61 $\frac{68}{97}$ ounces.	40. 221gal. 3.05qt.	62. 2 men.
20. \$22.222+	41. Performed.	63. 10 men
21. 20 $\frac{2}{3}$ gallons.	42. 102 $\frac{16}{45}$ days.	64. 6 compositors
22. 5m. 25d.	43. 9 $\frac{63}{8}$ days.	65. \$233 333+
23. 907 $\frac{1}{2}$ pounds.		

ARTICLE XXVI.

- | | | |
|----------------------------|------------------------------------|------------------------------|
| 1. 68 pounds. | 4. 8 days' work. | 7. $816\frac{1}{2}$ dollars, |
| 2. $13\frac{4}{5}$ pounds. | 5. $104\frac{8}{15}$ braces. | or \$816.993+ |
| 3. 210 florins. | 6. $2223\frac{1173}{1345}$ rubles. | |

ARTICLE XXVII

- | | |
|-----------------------------|--------------------------------------|
| 1. 66 square feet 4' 6" | 9. 233 sq. ft. 4' 5" 9" 6" |
| 2. 10 square feet 2' 10" | 4" 6" |
| 3. 1176 square feet 1' 6" | 10. 1310 solid feet 9' |
| 4. 44 square feet 0' 10" | 11. $73\frac{2}{7}$ square yards. |
| 5. 1102 square feet 10' 6" | 12. 1615 solid feet. |
| 6. 79 sq. ft. 11' 0" 6" 6" | 13. $343\frac{37}{108}$ square yards |
| 7. 126 sq. ft. 3' 6" 9" 5" | 14. $76\frac{2}{3}$ square yards |
| 5" | 15. 43 square yards. |
| 8. 745 sq. ft. 6' 10" 2" 4" | 16. $\$3.57\frac{8}{11}$ |

ARTICLE XXVIII.

- | | | |
|----------------------------------|-----------------------------|-------------------|
| 1. 1728 | 10. $\frac{8}{27}$ | 18. 83521 |
| 2. 14641 | 11. $\frac{64}{39319}$ | 19. 49 quotient. |
| 3. 371293 | 12. $\frac{81}{625}$ | 20. 512 product. |
| 4. 729 | 13. $915\frac{1}{16}$ | 21. 125 quotient. |
| 5. .0729 | 14. $111\frac{145}{232}$ | 22. 1296 product. |
| 6. .2401 | 15. 1.61051 | 23. 729 product. |
| 7. .00000256 | 16. $166496\frac{401}{625}$ | 24. 256 quotient. |
| 8. .001 | 17. 551.368 | 25. 19 quotient. |
| 9. $\frac{2}{36} = \frac{1}{18}$ | | |

ARTICLE XXIX.

- | | | |
|---------------|-------------|----------------------|
| 1. Performed. | 11. 1832 | 21. 512.25 |
| 2. Performed. | 12. 908 | 22. 917.5 |
| 3. 52 | 13. 7006 | 23. 6.248 |
| 4. 19 | 14. 830 | 24. 14.619 |
| 5. 55 | 15. 9103 | 25. .8164 |
| 6. 11 | 16. 60704 | 26. $365\frac{1}{4}$ |
| 7. 17 | 17. 6700 | 27. $3\frac{7}{8}$ |
| 8. 20 | 18. 407 | 28. $17\frac{1}{2}$ |
| 9. 69 | 19. 300806 | 29. $7\frac{1}{4}$ |
| 10. 921 | 20. 5147293 | 30. $\frac{1}{2}$ |

31. $23\frac{3}{4}$	59. 42	84. 416 feet.
32. $33\frac{3}{4}$	60. 1	85. 56 feet.
33. 2030	61. 7	7.79256+ in
34. 2.23606+	62. 1834	86. 20 feet:
35. 2.82842+	63. .5	87. 178r. 14ft.
36. 9.16515+	64. 9	7.31508+ in
37. 9.94987+	65. .12	88. 28r. 4ft.
38. 10.04987+	66. .21	8.28546+ in.
39. 10.95445+	67. .06	89. 33 inches.
40. 11.13552+	68. 8.48528+	90. 21 feet.
41. 11.95826+	69. 18.70828+	91. 3 miles.
42. 1.22474+	70 36.6606+.	92. $3\frac{3}{8}$ miles.
43. .01809+	71. 50.2991+	93. $112\frac{1}{2}$ rods.
44. 1.51657+	72. 20.12461+	94. 31 feet.
45. .77459+	73. 38.24918+	10.849+ in.
46. .86602+	74. 18 men.	95. 17 rods 11ft.
47. .81649+	75. 56 men.	11.45694+ in.
48. .89752+	76. 27 rows; 27	96. 1 mile 35 rods.
49. 10.64894+	trees in a row.	13.068+ ft.
50. 16.36306+	77. 25 men.	97. 24 rods 13 feet.
51. 32	78. 80 rods.	5.23536 inches
52. 28	79. 80 rods long,	in length;
53. 5	40 rods wide.	6 rods 3 feet.
54. 7	80. 120 rods long,	4.30884 inches.
55. 55	40 rods wide.	in breadth.
56. 42.5	81. 75 feet.	98. 7m. 21r. 15ft.
57. 53	82. 32 feet.	5.9616in.
58. 1.75	83. 80 miles.	

ARTICLE XXX.

1. 85	10. 90007	19. $2\frac{3}{4}$
2. 576	11. 8.635	20. 2.9624+
3. 26.4	12. .0053	21. 30 and 150
4. 6328	13. 4.9731+	22. 336 and 2016
5. 1203	14. 8.0259+	23. 28-feet.
6. 3291.36569+	15. 9.6548+	24. 2 feet 1 incb.
7. 3009	16. .6436+	25. 12ft. 7.5924 +
8. 9700	17. .9614+	inches.
9. 4072	18. $\frac{3}{4}$	26. 3 inches.

27. 8 inches	32. 9 feet	35. 6 feet
28. 5 feet.	0.20702+ in.	11.49699+ in.
29. 16 feet.	33. 4 feet	36. 2 feet
30. 2 feet 4 inches.	4.5981+ in.	7.47617+ in.
31. 4 feet	34. 5 feet	37. 5 feet
8.75179+ in.	6.27166+ in.	1.46779+ in

ARTICLE XXXI.

1. 89	3. 111	4. 423
2. 294		

ARTICLE XXXII.

1. 99	189m.	15. $10\frac{2}{3}$ and $16\frac{1}{3}$
2. 78 strokes.	8. 19	16. $20\frac{1}{3}$ and $36\frac{2}{3}$
3. 5m. 236r. 2yd.	9. 12 days.	17. 8, 12, 16, 20,
4. 1761 miles.	348 miles.	and 24
5. 3 years.	10. 11 days.	18. 13, 20, 27, 34,
6. 2	11. 9	41, and 48
7. Daily increase,	12. 30	19. 61, 88, and 115
4 miles.	13. $11\frac{1}{2}$	20. 78
Distance,	14. 7 and 10	

ARTICLE XXXIII.

1. 768	16. \$687194767.35	30. \$9654.516+
2. 2	17. 3	31. Am. \$15.174+
3. 34.17186+	18. 9	Int. \$10.034+
4. 3	19. 7	32. L. \$2207.135+
5. 1	20. 5	A. \$3207.135+
6. Performed.	21. Performed.	33. \$6
7. 16383	22. 1, 7, 49; 343	34. \$39.992+
8. 15624	23. 46656, 7776,	35. \$261.54+
9. 3577	1296, 216, 36	36. \$2959.657+
10. 103.90625	24. 53	37. \$473.788+
11. 166.66	25. \$126.247+	38. Pres. worth,
12. 131070	26. \$116.349+	\$311.804+
13. 2796202 $\frac{1}{8}$	27. \$386.883+	Discount,
14. $1\frac{88573}{177147}$	28. \$41.102+	\$688.196+
15. \$4294967.295	29. \$1110.011+	

ARTICLE XXXIV.

1. \$4202.736+	11. \$11664.619+	19. \$3312.045
2. \$1653.203	12. \$3138.724+	20. \$6171.688+
3. \$1221.252	13. \$9667.12+	21. S's, \$1925.007
4. \$4891.614	14. \$736.863+	D's, \$1807.856
5. \$1955.684+	15. To pay yearly;	22. \$1320.156+
6. \$310.243+	by \$44.174+	23. \$11712.098+
7. \$793.617+	16. \$993.66	24. \$1709.098+
8. \$3679.949+	17. \$1520.729+	25. \$2078.706+
9. \$1053.021+	18. \$703.38	26. \$2841.078
10. \$120.242+		

ARTICLE XXXV.

- | | | |
|--------------|--------------------|--------------------|
| 1. 75 cents. | 3. 21 carats fine. | 5. 42 cents. |
| 2. \$0.567+ | 4. 65 degrees. | 6. 20 carats fine. |

The teacher will observe, that the following are answers to questions in *Alligation Alternate*; and, therefore, the scholar may give other answers than those here stated, which may still be correct..

7. First Ans.

21	17	3 oz.
	18	1 oz.
	22	3 oz.
	24	4 oz.

Second Ans.

21	17	1 oz.
	18	3 oz.
	22	4 oz.
	24	3 oz.

Third Ans.

21	17	1+3=4
	18	1 =1
	22	4+3=7
	24	4 =4

Fourth Ans.

21	17	3 =3
	18	3+1=4
	22	3 =3
	24	4+3=7

These four answers added together will furnish a fifth answer, as follows:—

$$3+1+4+3=11 \text{ oz. of 17 carats fine.}$$

$$1+3+1+4=9 \text{ oz. of 18 carats fine.}$$

$$3+4+7+3=17 \text{ oz. of 22 carats fine.}$$

$$4+3+4+7=18 \text{ oz. of pure gold.}$$

A sixth answer might be obtained by adding together the *first and second answers*; a seventh, by adding together

the first, second, and third ; an eighth, by adding together the third and fourth ; a ninth, by adding together the second, third, and fourth ; &c. Any number of answers may be obtained, by multiplying or dividing each quantity in any one answer.

8. 4 ounces each, of 12, 16, and 17 carats fine, and 9oz. of 22 carats fine.
9. 30 pounds at 30 cents, 11lb. at 33 cents, 23lb. at 67 cents, and 26lb. at 86 cents. 2d answer ; 11lb. at 30 cents, 30lb. at 33 cents, 26lb. at 67 cents, and 23lb. at 86 cents.
10. 88 gallons each, of Canary and Sherry, and 48 gallons Claret.
11. 7 ounces of 16, 3oz. of 18, 3oz. of 19, 7oz. of 23 carats fine, and 4oz. of pure gold. 2d answer ; 7oz. of 16, 4oz. of 18, 3oz. of 19, 5oz. of 23 carats fine, and 6oz. of pure gold. 3d answer ; 3oz. of 16, 4oz. of 18, 4oz. of 19, 4oz. of 23 carats fine, and 3oz. of pure gold. 4th answer ; 3oz. of 16, 4oz. of 18, 7oz. of 19, 5oz. of 23 carats fine, and 3oz. of pure gold. 5th answer ; 3oz. of 16, 4oz. of 18, 3oz. of 19, 5oz. of 23 carats fine, and 2oz. of pure gold. 6th answer ; 4oz. of 16, 4oz. of 18, 7oz. of 19, 1oz. of 23 carats fine, and 7oz. of pure gold. 7th answer ; 3oz. of 16, 7oz. of 18, 3oz. of 19, 7oz. of 23 carats fine, and 2oz. of pure gold.
12. 15 gallons of water, 2gal. at 56 cents, 4gal. at 62 cents, and 60gal. at 75 cents. 2d answer ; 2gal. of water, 15gal. at 56, 60gal. at 62 cents, and 4gal. at 75 cents. 3d answer ; 17 gal. of water, 2gal. at 56 cents, 64gal. at 62 cents, and 60gal. at 75 cents.
13. 38 bushels of corn, 28bu. of rye, 6bu. of wheat at 90 cents, and 10bu. of wheat at 1 dollar. 2d answer ; 28bu. of corn, 38bu. of rye, 10bu. of wheat at 90 cents, and 6bu. of wheat at 1 dollar. 3d answer ; 66bu. of corn, 28bu. of rye, 16bu. of wheat at 90 cents, and 10bu. of wheat at 1 dollar.
14. 3 parts of alloy, 1 part of 7 ounces fine, 2 parts of 10 ounces fine, and 9 parts of pure silver. 2d answer ; 1 part of alloy, 3 parts of 7 ounces fine, 9 parts of 10

- ounces fine, and 2 parts of pure silver. 3d answer; 3 parts of alloy, 4 parts of 7 ounces fine, 2 parts of 10 ounces fine, and 11 parts of pure silver. 4th answer; 4 parts of alloy, 1 part of 7 ounces fine, 11 parts of 10 ounces fine, and 9 parts of pure silver.
15. Performed.
 16. 5 bushels of corn, 3 bushels of rye, and 2bu. of wheat at 96 cents. 2d answer; $4\frac{1}{2}$ bu. of corn, $7\frac{1}{2}$ bu. of rye, and $4\frac{1}{2}$ bu. of wheat at 96 cents.
 17. 10 ounces of 16 carats fine, 10oz. of 20 carats fine, 170oz. of pure gold, and 10oz. of alloy.
 18. 4.5 ounces of alloy, 1.8oz. of 6.5 ounces fine, and 5.4oz. of 10.5 ounces fine. 2d answer; 5.7oz. of alloy, 14.25oz. of 6.5 ounces fine, and 54.15oz. of 10.5 ounces fine.
 19. Performed.
 20. 1.8oz. of 14 carats fine, and 1.8oz. of 16 carats fine.
 21. 27oz. of 6 ounces fine, 9oz. of 7 ounces fine, and 9oz. of 9 ounces fine. 2d answer; 18oz. of 6 ounces fine, 54oz. of 7 ounces fine, and 36oz. of 9 ounces fine.
 22. 14 yards at 16 cents, and 14yd. at 17 cents.
 23. Performed.
 24. 56lb. each, at 9 and 12 cents, and 98lb. at 18 cents.
 25. 2bu. each, at 31, 37, and 46 cents, and 3bu. at 74 cents

ARTICLE XXXVI.

- | | |
|-----------------------------|--------------------------|
| 1. 720 changes. | 9. 831600 changes. |
| 2. 5040 changes. | 10. 840 variations. |
| 3. 120 days. | 11. 12600 whole numbers. |
| 4. 40320 changes. | 12. 69300 variations. |
| 5. 362880 different sums. | 13. 120 changes. |
| 6. 2432902008176640000 arr. | 14. 72 whole numbers. |
| 7. 99041 years 335 days. | 15. 8024 whole numbers. |
| 8. Performed. | 16. 30240 whole numbers |

ARTICLE XXXVII.

- | | |
|--------------------|---------------|
| 1. 20 combinations | 3. 153 span. |
| 2. 66 yoke. | 4. \$27041.56 |

- | | |
|-------------------------|-------------------------|
| 5. £18031572350 9s. 2d. | 9. 51975 selections. |
| 6. 6561 ways. | 10. 10000000000000 |
| 7. 16800 choices. | variations. |
| 8. 1296 changes. | 11. 8648640 variations. |

ARTICLE XXXVIII.

- | | | |
|-----------------------|--------------------|-----------------------|
| 1. \$3487.75 | 26. 1019 milrees | dol. 4 marks 3½ |
| 2. £784 14s. | 728 rees. | skillings. |
| 10½d. sterling. | 27. \$1573.292+ | 51. \$945.10 |
| 3. \$8561.28 | 28. \$2271.195 | 52. 6076 rigsbank |
| 4. £1003 5s. 6d. | 29. \$2109.388+ | dol. 3 marks 14 |
| sterling. | 30. 2678 dollars 6 | skillings. |
| 5. £804 1s. 0¾d. | reals 20 mar | 53. \$3218.24 |
| sterling. | 31. \$823.64 | 54. 2353 ducats |
| 6. \$19543.39 | 32. \$5809.92 | 5 carlins. |
| 7. \$23938.95 | 33. \$561.60 | 55. \$2876.97 |
| 8. \$8477.82 | 34. \$4034.61 | 56. 2391 ducats |
| 9. \$1364.60 | 35. 1318 rix dol. | 5 carlins. |
| 10. 21697 francs | 24 skil. | 57. \$2915.24 |
| 14 centimes. | 36. \$2481.75 | 58. 607 oncie 10 |
| 11. 9907 francs | 37. 819 rix dol. | tari. 5 grani. |
| 11 centimes. | 42 skil. | 59. \$2890.38 |
| 12. \$3871.50 | 38. \$1209.57+ | 60. 1035 crowns 2 |
| 13. \$2419 | 39. \$1160.68+ | tari. 8 grani. |
| 14. \$378.95 | 40. \$1045.66 | 61. \$1975.086+ |
| 15. 3737 marks | 41. 10456 rubles | 62. 1800 pezze 10 |
| 4 schillings. | 60 cop. | soldi. |
| 16. \$2106.215 | 42. \$1516.62 | 63. \$3063.11 |
| 17. \$2886 275 | 43. 10495 rubles | 64. 1334 pezze 16 |
| 18. 2296 marks 10 | 20 cop. | soldi 3½ denari. |
| schil. 8 pfen. | 44. \$2775.28 | 65. \$840.77 |
| 19. \$4964.67 | 45. \$2747.415 | 66. 10215 lire 6 |
| 20. \$2512.752 | 46. 4919 rix dol. | soldi 8 denari. |
| 21. 6895 flor. 7 sti. | 6 good gro. | 67. \$1450.68 |
| 8 pen. | 47. \$957.15½ | 68. 12903 lire 4 sol- |
| 22. 9044 florins. | 48. 4450 rix dol. | di 6¾ denari. |
| 23. \$3063.69 | 2⅔ good gro. | 69. \$1317.801 |
| 24. \$4160.68 | 49. \$1607.375 | 70. 10181 lire 17 |
| 25. \$1195.949 | 50. 4164 rigsbank | soldi 6 denari |

71. \$1255.114	96. \$3320.625	119. 35s. 7 $\frac{7}{128}$ gro
72. 10099 lire Ital.	97. 6102 rupees.	per £ sterling.
73. \$981.75	98. \$2415.15	120. 36s. 0 $\frac{24}{103}$ gro
74. \$1366.20	99. \$17973.86	per £ ster.
75. 3484 florins.	100. 5996 ta. 5 ma.	121. 35s. 3 $\frac{9}{17}$ gro
76. \$1479.80	101. \$24190.15	per £ ster.
77. 2483 rix dol.	102. \$2786.16	122. 33s. 11 $\frac{57}{72}$ gro.
36 creut.	103. 928 ta. 7 ma.	per £ ster.
78. 1834 cr. 61.38	2 cand.	123. \$4.44 per
baj.	104. \$1876.06	£ ster.
79. \$2091.205	105. \$2142.66 $\frac{1}{4}$	124. \$4.484 per
80. \$443.50	106. 2203 dol. 1so.	£ ster.
81. 2302 scudi.	107. \$5960.76	125. 100 pence Fl
82. \$1625.445	108. 878ta. 3 pard.	or 2 $\frac{1}{2}$ florins
83. 1686 scu. 6 tar.	2 mace.	per dollar.
84. \$1063.75	109. \$4736.76 $\frac{2}{3}$	126. 4 fr. 48 $\frac{122}{669}$
85. 4344 $\frac{1}{2}$ piastres.	110. 36175 flor.	cen. per dol.
86. \$1575.53	2 schil.	127. Performed.
87. 5503 $\frac{21}{41}$ pias.	111. \$17777.97	128. Performed.
88. \$8370.60	112. \$6405.23 $\frac{1}{16}$	129. Price, 681 $\frac{1}{4}$ d
89. 13826 sicca ru-	113. 5274 dol. 4	ster. per millr
pees 8 annas.	reals 13.6mar.	Gain, 41 $\frac{1}{4}$ d.
90. \$21239.83 $\frac{7}{8}$	114. \$2931.50	per milree.
91. 65803 rupees	115. 3754 rix dol.	130. 26 $\frac{1}{2}$ d. ster.
11 annas	6 fanams.	131. 32 $\frac{1}{2}$ cents per
92. \$53000	116. \$4132.75	mark banco.
93. \$5068.812+	117. 7701 dol.	132. 54 $\frac{1}{4}$ d. sterling
94. 12938 ru. 2qr.	5 livres.	
95. \$4122.37	118. Performed.	

ARTICLE XXXIX.

- | | |
|--------------------------------------|---------------------------------------|
| 1. 187.5 square feet. | 8. 254.469+ sq. in. |
| 2. 173.4375 square feet. | 9. 103.132+ sq. in. |
| 3. 142.5 rods. | 10. 62.388+ sq. in. |
| 4. 26.48437+ acres. | 11. 199262116.30247+ |
| 5. 101 $\frac{11}{32}$ square inches | square miles. |
| 6. 12 square feet. | 12. 27 solid inches. |
| 7. 15 $\frac{3}{4}$ square feet. | 13. 1ft. 1714 $\frac{1}{4}$ in. cubic |

- | | |
|-------------------------------------|---|
| 14. $53\frac{1}{12}$ cubic feet. | 27. 264491013810.90123+
cubic miles. |
| 15. 9.696 cubic inches. | 28. 235.61944+ cu. inches |
| 16. 5ft. 756in. cubic. | 29. 38.44403+ gallons. |
| 17. 16.29744 cubic feet. | 30. 125.04774+ gallons. |
| 18. 1 ft. 156.95559in. cubic. | 31. 165.93958+ gallons |
| 19. 972 cubic inches. | 32. $101\frac{1}{19}$ tons. |
| 20. 998.4 cubic inches. | 33. $191\frac{1}{19}$ tons. |
| 21. 716.28312 cu. inches. | 34. $109\frac{1}{19}$ tons. |
| 22. $1526\frac{2}{3}$ cubic inches. | 35. 454.08531+ tons. |
| 23. 25.51041 cubic feet. | 36. 219.3626+ tons. |
| 24. 3656.8224 cu. inches. | 37. $102\frac{6}{19}$ tons. |
| 25. 496.45448 gallons. | |
| 26. 263.8571+ cu. inches. | |

ARTICLE XL.

- | | | |
|--|--------------------------------------|------------------------------|
| 1. 1440 pounds. | 12. 420 pounds. | 23. 300 pounds. |
| 2. 160 pounds. | 13. $5485\frac{2}{7}$ pounds. | 24. $214\frac{2}{7}$ pounds. |
| 3. 9 feet. | 14. 270 pounds. | 428 $\frac{4}{7}$ pounds. |
| 4. 1 foot. | 15. 200 pounds. | 25. 21991.14855+
pounds. |
| 5. $56\frac{2}{11}$ pounds. | 16. $166\frac{2}{3}$ pounds. | 26. 25132.7412
pounds. |
| 6. $333\frac{1}{3}$ pounds. | 17. 1140 pounds. | 27. 2ft. 8.32834+
inches. |
| 7. 4ft., and 8ft. | 18. $57\frac{1}{7}$ pounds. | 28. 164933.61412+
pounds. |
| 8. A carries $93\frac{3}{4}$ lb.
B carries $156\frac{1}{4}$ lb. | 19. $506\frac{2}{3}$ pounds. | |
| 9. 5 feet. | 20. $71\frac{1}{7}$ feet. | |
| 10. 6.4 inches. | 21. $2348\frac{1}{3}\frac{6}{3}$ lb. | |
| 11. $3\frac{1}{4}$ pounds. | 22. $857\frac{1}{7}$ pounds. | |

ARTICLE XLI.

- | | | |
|--------------------|---|--------------------------------------|
| 1. $\frac{1}{20}$ | 8. 55 | 13. 25lb. at \$1.10
the pound, to |
| 2. .05 | 9. \$70.80 | 10lb. at 75cts |
| 3. $15\frac{3}{4}$ | 10. \$500 | 14. $17\frac{1}{2}$ days. |
| 4. $\frac{29}{40}$ | 11. 10 days. | 15. 323 miles. |
| 5. $\frac{13}{8}$ | 12. Income, \$200
A spends \$175
B spends \$205 | 16. \$2 per gallon |
| 6. $\frac{3}{8}$ | | |
| 7. 20 | | |

17. $\frac{1}{15}$ of his annual income for 4 years is $\frac{1}{15}$ of it for 1
F

- year; consequently $\frac{4}{15}$ of 1 year's income is 20 dollars more than $\frac{1}{4}$ of it. $\frac{1}{4}$ is equal to $\frac{15}{60}$, and $\frac{4}{15}$ is equal to $\frac{16}{60}$; therefore $\frac{15}{60}$ of his income and 20 dollars is equal to $\frac{16}{60}$ of it, and 20 dollars must be $\frac{1}{60}$ of it. The answer is 60 times \$20, or \$1200.
- 18 The hare, running at the rate of 10 miles an hour, runs $195\frac{2}{3}$ yards in 40 seconds, which, added to 40 yards, makes $235\frac{2}{3}$ yards, which the hare has before the hound, when the hound starts. The hound gains 14080 yards in an hour, which is $234\frac{2}{3}$ yards in a minute; therefore the hound must run as many minutes as $234\frac{2}{3}$ is contained times in $235\frac{2}{3}$. The answer is $1\frac{1}{264}$ minute. The distance run by the hound is 530 yards.
19. Deducting $2\frac{1}{2}$ geese from 100, the remainder is $97\frac{1}{2}$ geese, which is $\frac{2}{3}$ of his whole flock. Since $97\frac{1}{2}$ is $\frac{2}{3}$ of the flock, $\frac{1}{3}$ of $97\frac{1}{2}$ is $\frac{1}{2}$ of the flock: $\frac{1}{3}$ of $97\frac{1}{2}$ is $32\frac{1}{2}$, and twice $32\frac{1}{2}$ is 65. Ans. 65 geese.
20. 48 men.
21. 15 boys; 45 women; 90 men.
22. The sheep is to the cow as 1 to 8; the cow to the oxen as 8 to 24; $1+8+24=33$; therefore $\frac{1}{33}$ of \$82.50 is the price of the sheep. Ans. sheep, \$2.50; cow, \$20; oxen, \$60.
23. If 9 inches be added to $\frac{1}{2}$ the body, it makes the length of the tail; if to this, 9 inches more be added, it makes the body, that is, $\frac{1}{2}$ the body and 18 inches make the whole body. The body, then, is 36 inches, and the whole fish is 6 feet.
24. 390270
25. $40\frac{1}{4}$ cents.
26. \$68.492+
27. 6 cents.
- 28 In moving once round the dial-plate, the minute-hand gains 55 minutes on the hour-hand; therefore it moves $\frac{60}{55}$ or $1\frac{1}{11}$ minute, to gain 1 minute. While the minute-hand is moving round from 12 to 12 again, the hour-hand will have moved 5 minutes, and the minute-hand will have to gain 60 minutes, before they will again be together. 60 times $1\frac{1}{11}$ minute is $65\frac{5}{11}$ minutes = 1h. 5m. $27\frac{2}{11}$ seconds. Ans. 5 minutes $27\frac{2}{11}$ sec. past 1

29. The boat, moving up stream, being retarded 2 miles an hour by the current, goes only 6 miles an hour; the other being aided 2 miles an hour by the current, goes 10 miles an hour; 300 must be divided into two parts in the ratio of 6 to 10. $6+10=16$; $\frac{1}{16}$ of 300 is $18\frac{3}{4}$; $18\frac{3}{4} \times 6 = 112\frac{1}{2}$; $18\frac{3}{4} \times 10 = 187\frac{1}{2}$. Ans 112 $\frac{1}{2}$ miles from lower, 187 $\frac{1}{2}$ from upper place.
- | | |
|---|--------------------------------------|
| 30. \$50 each.
200 melons. | Boy, \$54 |
| 31. 80 | 38. A's, 14s. 0 $\frac{8}{19}$ d. |
| 32. 24 of each. | B's, 10s. 6 $\frac{6}{19}$ d. |
| 33. 24ft. 0'. 3". 4''' . 6''' | C's, 8s. 5 $\frac{1}{19}$ d. |
| 34. 5 per cent. | D's, 7s. 0 $\frac{4}{19}$ d. |
| 35. A, 7 $\frac{25}{28}$ miles an hour. | 39. 21m. 49 $\frac{1}{11}$ s. past 4 |
| B, 6 $\frac{11}{28}$ miles an hour. | 40. A, 312 acres. |
| 36. \$11875 | B, 412 acres. |
| 37. Captain, \$243 | C, 476 acres. |
| Men, \$162 each. | 41. 1 foot 5 $\frac{13}{67}$ inches. |
| | 42. 10 $\frac{419}{2912}$ |
43. A can do $\frac{1}{10}$ of it, and B $\frac{1}{13}$ of it, in a day; therefore both together can do $\frac{23}{130}$ of it in a day; and it will be finished in as many days as $\frac{23}{130}$ is contained times in $\frac{130}{130}$. Ans. 5 $\frac{15}{23}$ days.
44. A's, \$57142 $\frac{6}{7}$; B's, \$42857 $\frac{1}{7}$
45. 600 trees.
46. The first will empty $\frac{1}{60}$ of it in a minute; the second $\frac{1}{120}$ of it, and the third $\frac{1}{180}$ of it in a minute; these added together make $\frac{11}{360}$ of it; hence they will all empty $\frac{11}{360}$ of it in a minute. 11 is contained in 360 32 $\frac{8}{11}$ times. Ans. 32 $\frac{8}{11}$ minutes
47. \$311.50
48. When they were married, her age was 1 year to his 3; 15 years being added to their ages, hers is 2 years to his 4; that is, her age was doubled, and his was $\frac{4}{3}$ of what it was. As 15 years doubled her age, she was 15, and he was 45.
49. A, \$445; B, \$230; C, \$325
50. $\frac{53}{63}$
51. 5329 square feet.
52. \$2800

53. The three men ate 8 loaves; that is, $2\frac{2}{3}$ loaves each; B furnished only $\frac{1}{3}$ of a loaf more than he ate; but A furnished $\frac{2}{3}$ of a loaf more than he ate. The decision was, that A should have 7 pieces, and B 1 piece.
54. 6
55. $\frac{2}{3}$ and $\frac{3}{4}$, when reduced to a common denominator, are $\frac{8}{12}$ and $\frac{9}{12}$; therefore their ages are in the ratio of 8 to 9, and 10 years must be $\frac{1}{3}$ of the age of the elder, and $\frac{1}{6}$ of the age of the younger. Elder 90, younger 80 years.
56. He bought 4 at 2 cents apiece, as often as he bought 3 at 3 cents apiece. 4 at 2 cents is 8 cents, and 3 at 3 cents is 9 cents; therefore he gave 17 cents for every 7 lemons, which is $2\frac{3}{7}$ cents each. He sold them at $2\frac{1}{2}$ cents each. The difference between $2\frac{1}{2}$ and $2\frac{3}{7}$ is $\frac{1}{14}$. Hence it appears, he gained $\frac{1}{14}$ of a cent on each lemon, which is 1 cent on 14 lemons. Therefore he bought $14 \times 25 = 350$ lemons.
57. $8\frac{1}{2}$ barrels.
58. To answer this question, the 12 hours from noon to midnight are to be divided into 2 parts, in the ratio of 4 to 5. $4+5=9$; $\frac{1}{9}$ of 12 is $1\frac{1}{3}$; $1\frac{1}{3} \times 4$ is $5\frac{1}{3}$. Ans. 20 minutes past 5.
59. $137\frac{29}{61}$
60. The difference between the squares is 309 men, consequently, a side of the last square was 155 men. The square of 155 is 24025, which was 25 men more than his number. Ans. 24000 men.
61. The first will fill $\frac{1}{40}$ of it in a minute, and the second $\frac{1}{30}$ of it in a minute; $\frac{1}{40}$ and $\frac{1}{30}$, brought to a common denominator, are $\frac{3}{200}$ and $\frac{4}{200}$. They both fill $\frac{7}{200}$ of it in a minute; the discharging pipe empties $\frac{1}{25}$, which is $\frac{8}{200}$ of it in a minute; therefore the supplying pipes gain $\frac{1}{200}$ of it in a minute, and the cistern will be filled in 200 minutes. Ans. 3 hours 20 minutes.
62. The first and second do $\frac{7}{11}$ of it, and the third the other $\frac{4}{11}$ of it; the second and third do $\frac{7}{11}$ of it; therefore the first does $\frac{4}{11}$ of it, and the first and third together $\frac{8}{11}$ and $\frac{2}{11}$ of it; $\frac{4}{11}$ and $\frac{2}{11}$ added together is $\frac{6}{11}$; consequently the second does the other $\frac{5}{11}$. Ans. $\frac{5}{11}$.

63. There were 3 cows and 6 sheep to 1 ox; that is, $\frac{1}{10}$ were oxen, $\frac{3}{10}$ cows, and $\frac{6}{10}$ sheep. Ans. 8 oxen, 24 cows, 48 sheep.
64. \$560.173
65. \$12500 is to be divided into 2 parts, in the ratio of 7 to 9. $7+9=16$; $\frac{7}{16}$ of 12500 is 781.25; $781.25 \times 7 = 5468.75$; $781.25 \times 9 = 7031.25$. Ans. wife's, \$7031.25; son's, \$5468.75.
66. $\frac{1}{15}$ of it would last both together 1 day; $\frac{1}{27}$ of it would last the woman alone 1 day; consequently the difference between $\frac{1}{15}$ and $\frac{1}{27}$, which is $\frac{1}{135}$, would last the man alone 1 day; therefore it would last the man alone as many days as $\frac{1}{135}$ is contained times in $\frac{1}{135}$, which is $33\frac{1}{3}$ times. Ans. $33\frac{1}{3}$ days.
67. 12 calves; 6 sheep.
68. \$151.055+
69. The minute-hand must gain 30 minutes on the hour hand before they will point in opposite directions. The minute-hand, in moving $1\frac{1}{11}$ minute, gains 1 minute; therefore, $1\frac{1}{11} \times 30$ must give the Answer, $32\frac{8}{11}$ minutes past 12.
70. One man would do it in 3 times 56 days, or 168 days. and one woman would do it in 224 days. One man does $\frac{1}{168}$ of it in 1 day, and one woman $\frac{1}{224}$; $\frac{1}{168}$ and $\frac{1}{224}$, reduced to a common denominator, are $\frac{4}{672}$ and $\frac{3}{672} = \frac{7}{672} = \frac{1}{96}$. Ans. 96 days.
71. $\frac{5}{8}$ of 12 is $7\frac{1}{2}$. $12+7\frac{1}{2}=19\frac{1}{2}$. $\frac{5}{8}$ of the father's age being added to $19\frac{1}{2}$ years, gives the father's age; therefore $19\frac{1}{2}$ years is $\frac{3}{8}$ of the father's age, and $\frac{1}{8}$ of it is $\frac{1}{3}$ of $19\frac{1}{2}$ years, which is $6\frac{1}{2}$ years; $6\frac{1}{2} \times 8 = 52$. Ans. 52 years.
72. The first lived $\frac{1}{8}$, the second $\frac{2}{8}$, and the third $\frac{3}{8}$ of a mile from the church; therefore, the first must pay \$23 as often as the second pays \$23 and the third \$16. $23+23+16=67$. The first must pay $\frac{2}{67}$, the second $\frac{2}{67}$, and the third $\frac{1}{67}$ of \$730. Ans. first, \$305.07 $\frac{31}{67}$; second, \$250.59 $\frac{47}{67}$; third, \$174.32 $\frac{56}{67}$.
73. Allen can reap $\frac{1}{15}$, and Brooks $\frac{1}{18}$ in a day; $\frac{1}{15}$ and $\frac{1}{18}$ added together make $\frac{2}{90}$; both together will reap it in

- as many days as 29 is contained times in 208. Ans. $7\frac{5}{29}$ days.
74. In $22\frac{1}{2}$ days, A travels 405 miles, and B travels the same distance in $40\frac{1}{2}$ days; because A turned back 9 days' travel for B, which he had to travel over again in pursuing his journey, making 18 days of B's travelling; $18 + 22\frac{1}{2} = 40\frac{1}{2}$; $405 \div 40\frac{1}{2} = 10$. Ans. 10 miles per day.
75. 1 minute 33 seconds.
76. $11\frac{2}{3}$ rods; or, 11r. 4yd. 2ft. $0\frac{2}{3}$ in.
77. 12 bushels of corn to 25 of oats.
78. $9\frac{7}{8}$ cents.
79. He had travelled 42 parts of the distance, and had 25 parts to travel. $42 + 25 = 67$; $\frac{1}{67}$ of 335 is 5; $5 \times 42 = 210$; 210 miles in 7 days. Ans. 30 miles per day.
80. Wife's, \$18833.33 $\frac{1}{3}$; son's, \$17333.33 $\frac{1}{3}$; daughter's, \$13833.33 $\frac{1}{3}$.
81. Each stockholder owns $\frac{4}{32}$ of the whole. A sold $\frac{3}{32}$, and had $\frac{1}{32}$ left. B sells 2 of his shares, which are divided equally among the other shares; consequently there are now only 30 shares; therefore, A owns $\frac{1}{30}$ of the whole.
82. 367 feet 6 inches.
83. By selling $\frac{1}{4}$ of his linen and $\frac{1}{5}$ of his cotton for \$12, he gained 60 cents; therefore the same must have cost him \$11.40; and 4 times the same quantity must have cost him 4 times as much; hence, all his linen and $\frac{4}{5}$ of his cotton cost him \$45.60; which leaves \$4.40 for the price of $\frac{1}{5}$ of the cotton; $\$4.40 \times 5 = \22 , the whole cost of the cotton; leaving \$28 for the cost of the linen. Ans. 84 yards of linen; 110 yards of cotton.
84. In 8 months.
85. 420 skins.
86. 12 cents per dozen.
87. 15 feet 8.495+ inches, square measure.
88. Spouting from his throat only, he will fill $\frac{1}{6}$ of the cistern in an hour; from his right eye only, $\frac{1}{8}$ of it in an hour; from his left eye only, $\frac{1}{12}$ of it in an hour; and from his right foot only, $\frac{1}{4}$ of it in an hour. These,

added together, make $\frac{6\frac{1}{2}}{144}$ of it in an hour. $\frac{6\frac{1}{2}}{144}$ is contained in $\frac{144}{144} 2\frac{1}{6}$ times. Ans. 2h. 12m. 55 $\frac{1}{3}$ s.

89. After receiving 5 times as much as he spent, he had 200 dollars. If he had received as much only as he had spent, he would have had \$100; therefore the other \$100 is 4 times as much as he spent. Ans. \$25.

90. As the hare makes 4 leaps to the hound's 3, the hound makes 6 leaps to the hare's 8, and 2 leaps to the hare's $2\frac{2}{3}$; therefore, since 2 of the hound's leaps are equal to 3 of the hare's, the hound, in making 2 leaps, gains $\frac{1}{3}$ of 1 of the hare's leaps, and by 1 leap, $\frac{1}{2}$ as much, that is, $\frac{1}{3}$ of 1 of the hare's leaps; consequently the hound must make 6 times 50 leaps. Ans. 300 leaps.

91. 5lb. at 10cts., 2lb. at 13cts., and 2lb. at 16cts

92. 32 $\frac{1}{4}$ gallons.

93. A lost 80 $\frac{140}{167}$ tons; B, 54 $\frac{222}{167}$ tons; C, 15 $\frac{45}{167}$ tons

94. A ought to pay \$16.44 $\frac{4}{5}$, and B, \$20.55 $\frac{5}{7}$.

95. To perform this question, first find the rent of the house for 14 weeks, and divide it among the first 10 lodgers; then find the rent for 3 weeks, and divide it first among 14 lodgers, then among 18, &c. to the end of the time. One lodger of each class will pay as follows:—

1st class, \$39.090 $\frac{111761320}{257306049}$ = \$39.090 $\frac{15490}{39039}$

2d " \$12.167 $\frac{82301817}{257306049}$ = \$12.167 $\frac{12487}{39039}$

3d " \$8.046 $\frac{1246206}{2827539}$ = \$8.046 $\frac{2458}{3377}$

4th " \$4.841 $\frac{7553}{24167}$ = \$4.841 $\frac{581}{1859}$

5th " \$2.218 $\frac{316}{338}$ = \$2.218 $\frac{158}{179}$

96. 3 apples and 12 pears cost 20 cents, and 4 times as many will cost 4 times as much; that is, 12 apples and 48 pears will cost 80 cents; the price of 12 apples and 6 pears, taken from 80 cents, leaves 63 cents for 42 pears, which is $1\frac{1}{2}$ cent for one. Ans. the price of an apple is $\frac{2}{3}$ of a cent, that of a pear $1\frac{1}{2}$ cent.

97. 221 stones.

C's, \$4506.23

98. 52 rods long.

D's, \$5632.85

- 3 acres.

100. \$1389.42+

99. A's, \$1126.62

101. 14400 shingles.

- B's, \$3755.19

102. \$51.11 $\frac{1}{2}$

103. The 3 parcels of hops, added together, make 1850lb. which, at 12 cents a pound, come to \$222. But Allen's 450lb., being $33\frac{1}{3}$ per cent. better, are equal to 600lb. of the others; 600lb. + 890lb. + 510lb. = 2000lb.; \$222 for 2000lb. is 11 cents 1 mill per lb. which is the value of Brooks's and Chase's hops; the value of Allen's, being $33\frac{1}{3}$ per cent. better, is 14 cents 8 mills per lb.

Ans. Chase's, 510lb., at 11cts. 1 mill	\$56.61
Brooks's, 890lb., at 11cts. 1 mill,	\$98.79
Allen's, 450lb., at 14 cts. 8 mills,	\$66.60
	<u>\$222.00</u>

104. The solution of the preceding question renders any explanation of this unnecessary.

Ans. Y's, 60bls., at \$8.57 $\frac{1}{7}$, is	\$514.28 $\frac{4}{7}$
X's, 60bls., at the same, is	\$514.28 $\frac{4}{7}$
W's, 60bls., at \$12.85 $\frac{5}{7}$, is	\$771.42 $\frac{6}{7}$
	<u>\$1800.00</u>

105. $5\frac{1}{2}$ months.

106. First term is 2; difference, 3.

107. \$723.63

108. The first cup weighs 12oz.; therefore, the second cup and cover together weigh 36oz., and the 2 cups and cover, taken together, weigh 48oz. If the first cup be covered, it will weigh twice as much as the second; therefore, the first cup and cover are $\frac{2}{3}$ of 48 oz.; and the second cup $\frac{1}{3}$ of 48oz., which is 16oz.; consequently the cover is 20oz. Ans. cover, 20oz.; second cup, 16oz.

109. The Bill was drawn for £1759 1s. 9 $\frac{1}{11}$ d. Degrand invested for Grey's account \$8348.07+

110. $53\frac{49086571}{181398528}$

111. 115 rods 107 feet 25.046+ inches.

112. \$473.70+

113. $\frac{1}{4}$ of the first, and $\frac{1}{3}$ of the second are together equal to \$120; therefore $\frac{2}{4}$ of the first, and $\frac{2}{3}$, or the whole of the second, are three times as much, that is, \$360.

Taking \$360 from \$400, there remains \$40 for $\frac{1}{4}$ of the first. Ans. first, \$160, and the second, \$240

114. 6859	20 cwt., at \$8
115. \$948.88 $\frac{1}{2}$	118. \$1215
116. \$29.993+	119. \$46.35
117. 5cwt., at \$12	120. Wheat, \$1.25
5cwt., at \$10	Rye, 90 cents.

121. After the exchange, he had 8 apples to 5 pears. The price of an apple was $\frac{5}{12}$ of a cent; therefore 8 apples cost $\frac{40}{3}$ of a cent, and 5 pears cost the same; consequently, 8 apples and 5 pears cost $\frac{80}{3}$, or $\frac{20}{3}$ of a cent, which is $\frac{20}{3}$ of a cent apiece; therefore he gained $\frac{1}{3}$ of a cent on each, which is 19 cents on 39. $\frac{8}{13}$ were apples; $\frac{8}{13}$ of 39 is 24, which is half the number of apples which he bought. Ans. He bought 48 apples; they cost 20 cts.

122. The ratio of the areas of two squares is the ratio of the squares of their sides. The square of 3 is 9, and the square of 5 is 25; therefore 30600 square feet is to be divided into two parts in the ratio of 9 to 25; $9+25=34$; $30600 \div 34=900$; $900 \times 25=22500$; $900 \times 9=8100$; $\sqrt{8100}$ is the side of the smaller piece, and $\sqrt{22500}$ is the side of the greater piece. Ans. Side of the smaller piece, 90 feet; side of the greater, 150 feet.

123. 204 $\frac{4}{7}$ boards.	128. 6 $\frac{1}{2}$ per cent.
124. 66 cents.	129. Bill drawn, \$2556
125. \$119.4375	Discount, \$25.56
126. 39 $\frac{1}{11}$ per cent.	130. 2250 pounds.
127. He lost \$39.06	23 $\frac{1}{2}$ cents per lb.

131. The waste being 18 per cent., 615lb. clear must have come from 750lb. rough, leaving 10lb. rough in G's hands. 615lb. clear, at 60 per 100lb., is \$3.69, which will pay for 46 $\frac{1}{2}$ lb. rough. Ans. 36 $\frac{1}{2}$ lb.

132. The three lots together make 3402lb., which, at 10 cents a pound, come to \$340.20; but 100lb. of

Bond's hops are equal in value to $112\frac{1}{2}$ lb. of Allen's; 720 lb. is $7\frac{1}{2}$ hundred pounds; $112.5 \text{ lb.} \times 7\frac{1}{2} = 810 \text{ lb.}$; therefore Bond's 720 lb. are equal in value to Allen's 810 lb. Cook's hops are 25 per cent. better than Bond's; 25 per cent. on 112.5 lb. is $28\frac{1}{8}$ lb., which, added to $112\frac{1}{2}$ lb., makes $140\frac{5}{8}$ lb.; therefore Cook's hops are $40\frac{5}{8}$ per cent. better than Allen's. $40\frac{5}{8}$ per cent. on 1872 lb. is 760.5 lb., which, added to 1872 lb., makes 2632.5 lb.; therefore Cook's 1872 lb. are equal in value to 2632.5 lb. of Allen's. $810 + 810 + 2632.5 = 4252\frac{1}{2}$ lb. \$340.20 for 4252.5 lb. is 8 cents per lb., which is the value of Allen's hops. $12\frac{1}{2}$ per cent. on 8 cents is 1 cent; therefore Bond's hops are worth 9 cents per lb. and 25 per cent. on 9 cents is $2\frac{1}{4}$ cents; therefore Cook's hops are worth $11\frac{1}{4}$ cents per lb. Ans. Allen's, \$64.80; Bond's, \$64.80, and Cook's, \$210.00.

133. A and B must pay $\$1.87\frac{1}{2}$ each for the first 15 miles; A, B, and C, must pay \$5 each, for the 60 miles they rode together, before they took in D; A, B, C, and D, must pay $\$1.56\frac{1}{4}$ each, for the last 25 miles. Ans. A, $\$8.43\frac{1}{4}$; B, $\$8.43\frac{1}{4}$; C, $\$6.56\frac{1}{4}$; D, $\$1.56\frac{1}{4}$.

134. 1 acre.

135. 4 feet $0.22542 +$ inch.

136. 46 miles 131 rods $2.921 +$ feet.

PRIZE QUESTION.

137. In June, 1835, a premium of \$50 was offered for the most "lucid analytical solution" of the last question in the Third Part of Emerson's North American Arithmetic; and subsequently a committee to examine the solutions presented, and award the premium, was raised in the manner proposed. The committee have given a very careful and patient attention to the labors of the trust confided to them, and they now make the following

REPORT.

The whole number of solutions presented, was 112; of which 48 gave the true answer. After excluding those solutions which gave incorrect answers, the committee proceeded to diminish the

remaining number, by excluding those which were algebraical, and, also, those which were performed either by *position* or by *proportion*; retaining for the comparative examination, such only as were strictly analytical. The solution for which the committee have awarded the premium, was presented by JAMES ROBINSON, Principal of the Department of Arithmetic, Bowdoin School, Boston. It is as follows:—

SOLUTION. It is evident that a part of the given number of oxen, in each condition of this question, must be supported by the grass at *first standing* on the given number of acres, and that the remaining part must be supported by the *growth*. It is also evident that the number of oxen that can be supported by the grass at first standing on the ground, must be in a direct ratio to the number of acres, and in an inverse ratio to the time of grazing. And it is further obvious, that the number of oxen that can be supported by the growth of the grass, must be in a direct ratio to the number of acres, without any regard to the *time* of grazing; because, the number of oxen that would consume the growth of any given number of acres during any given time, would consume the same growth continually.

By the first condition of the question, 12 oxen consume $3\frac{1}{2}$ acres of grass and its growth in 4 weeks; the 10 acres being $\frac{20}{7}$ of $3\frac{1}{2}$ acres, it would require $\frac{20}{7}$ as many oxen to consume 10 acres of grass and its growth in the same time; —and 12 oxen multiplied by $\frac{20}{7}$ are $34\frac{2}{7}$ oxen. To consume the same in 9 weeks, would require only $\frac{4}{9}$ as many oxen; and $34\frac{2}{7}$ oxen multiplied by $\frac{4}{9}$ are $15\frac{5}{21}$ oxen.

By the second condition, 21 oxen consume 10 acres of grass and its growth in 9 weeks; —and 21 oxen less $15\frac{5}{21}$ oxen are $5\frac{1}{3}$ oxen. Then it follows, that $5\frac{1}{3}$ oxen in 9 weeks would consume the growth of 10 acres of grass during the 5 remaining weeks. To consume the growth of 10 acres during 9 weeks, would require $\frac{2}{9}$ as many oxen, and $5\frac{1}{3}$ oxen multiplied by $\frac{2}{9}$ are $10\frac{1}{3}$ oxen. Then, 21 oxen less $10\frac{1}{3}$ oxen are $10\frac{2}{3}$ oxen. Hence it is evident that $10\frac{2}{3}$ oxen, in 9 weeks, would consume the grass at first on the 10 acres; —and it is also evident that $10\frac{1}{3}$ oxen, in 9 weeks, would consume the growth of the 10 acres of grass during the 9 weeks.

The 24 acres in the third condition being $2\frac{2}{3}$, or $2\frac{2}{3}$ times 10 acres, it would require $2\frac{2}{3}$ times $10\frac{2}{3}$ oxen to consume the grass at first on the 24 acres, in 9 weeks;—and $10\frac{2}{3}$ oxen multiplied by $2\frac{2}{3}$ are $25\frac{8}{9}$ oxen. To consume the same in 18 weeks, would require only $\frac{9}{18}$, or $\frac{1}{2}$ as many oxen;—and $25\frac{8}{9}$ oxen divided by 2, are $12\frac{4}{9}$ oxen. And to consume the growth of the 24 acres of grass during the 18 weeks would require $2\frac{2}{3}$ times $10\frac{1}{3}$ oxen;—and $10\frac{1}{3}$ oxen multiplied by $2\frac{2}{3}$ are $24\frac{5}{6}$ oxen.

Lastly, $12\frac{4}{9}$ oxen plus $24\frac{5}{6}$ oxen are $37\frac{11}{18}$ oxen, the number required.

By order of the Committee,

P. MACKINTOSH, *Chairman*.

Solution of Example 7, ART. XVII.

15.50	Discount paid to bank, on 1st renewal of note.
.68975	Interest on this discount for 8 months, 27 days.
15.50	Discount paid to bank, on the 2d renewal.
.4495	Interest on this discount for 5 months, 24 days.
13.50	Discount on 3d renewal, the time being 2m. 21d
.19225	Interest on this discount for 2m. 21 d.
<u>1000.00000</u>	Principal paid to bank, at the end of year.
<u>1045.8215</u>	Sum paid into the bank, and loss of interest.
984.50	Sum received from the bank, and put on int.
59.07	Interest on this sum for one year.
<u>1043.57</u>	
\$ 2.2515	The sum lost by the exchange. The Answer.





